

# Workshop Practices and General Engineering

(Objective Type Questions)  
(According to the Syllabus Prescribed by  
Director General of Civil Aviation, Govt. of India for  
BAMEL, Paper-II)



**FIRST EDITION**

**WORKSHOP PRACTICES &  
GENERAL ENGINEERING  
(Objective Type Questions)**

**Prepared for and by**

*L.N.U.M. Society Group of Institutes*

\* *School of Aeronautics*

(Approved by Director General of Civil Aviation, Govt. of India)

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(Approved by Director General of Civil Aviation, Govt. of India)

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**Dedicated To**

*Shri. Laxmi Narain Verma*  
**[ Who Lived An Honest Life ]**

## ***Preface***

*This book of Workshop Practices (Objective type Questions) is an outcome of the hard work, knowledge and dedication of the Instructors of this subject. This book is highly beneficial to the students of the Aircraft Maintenance Engineering (A.M.E.) appearing in BAMEL Paper-II of Director General of Civil Aviation.*

*The book in your hand is the treasure of the valuable questions on the various topics of Workshop Practices according to the syllabus prescribed by the DGCA for paper II.*

*The first eight Chapters of this book contain the exhaustive questions on all the topics of Workshop practices and are discussed in the order as mentioned in the DGCA syllabus. The last three chapters contain the questions from the other topics of paper II such as Airframe, A/C Instrument Systems, A/C Electrical Systems, Aircraft Maintenance Practices etc. which all together add to the utility of this book, there chapters also includes questions from old DGCA licence exam Papers-II.*

*The questions on various topics are prepared in such a manner that they clear the basic concepts of the topics to students as well as add the data of facts in their minds. These questions have been provided with the answers for the ready reference of the students.*

*I am highly thankful to our director Mr. C.C. Ashoka for his able guidance and encouragement. I appreciate with hearty thanks for the efforts of all concerned, who contributed to compile this publication as an valuable offer to AME students.*

*Utmost care has been taken, while preparing, typing the questions and marking their answers. We will highly welcome the suggestions, corrections and feed back our esteemed readers and will be incorporated in the next edition.*

***Rajesh Kumar Saluja***  
***Senior Lecturer***

***Dated : January, 2008***

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# CHAPTER - 1

## KNOWLEDGE OF MATERIAL, PARTS AND USE OF HAND TOOLS, SIMPLE MACHINE TOOLS AND PRECISION MEASURING INSTRUMENTS

1. Cast tool alloys have high-temperature strength and wear resistance. They are principally alloys of
- nickel, cobalt and chromium
  - cobalt, chromium and tungsten \*
  - tungsten, chromium and molybdenum
  - columbium and zirconium
  - cobalt, boron and aluminium
9. Fig.1.1 shows a
- lathe tool
  - carrier
  - lathe dog \*
  - lathe centre
  - lathe chuck

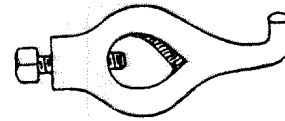


Fig.1.1

2. Tumbler gear is concerned with
- automobiles
  - aeroplanes
  - lathe \*
  - ships
  - war vehicles
3. A fly cutter is used on following machine tool
- shaper
  - lathe
  - broaching machine
  - gear cutting machine
  - milling machine \*
4. Power from the leadscrew to the carriage in lathe is transmitted through
- bevel gear
  - worm and gear
  - tumbler gear
  - half nut \*
  - full nut
5. Which of the following machines uses fly cutter
- shaper
  - planer
  - broacher
  - gear cutter
  - milling machine \*
6. The best process for the mass manufacturing of steel balls is
- turning on a lathe
  - turning on a capstan or Turret Lathe
  - turning on an automatic lathe
  - cold heading \*
  - casting
7. A tool used for removing broken bolts and studs from a hole is known as
- Screw driver
  - Punch
  - Ezy-out \*
  - Telescopic rod
  - Emry rod
8. The cementite is
- iron carbide \*
  - a mixture of ferrite and iron-carbide
  - a mixture of pearlite and iron-carbide
  - alpha iron and iron carbide
10. In which of the following machine tool, the motion is applied to the workpiece
- engine lathe
  - vertical borer
  - horizontal borer
  - shaper \*
  - planer
11. In which of the following machine tool, the feed motion is applied to the tool
- horizontal miller
  - vertical knee type miller
  - vertical bed type miller
  - shaper
  - broacher \*
12. The overall efficiency of engine lathe, borer and shaper is of the order of 70%. The overall efficiency of miller is of the order of
- 85%
  - 80%
  - 70%
  - 50% \*
  - 40%
13. The overall efficiency of grinders is of the order of
- 100%
  - 85% \*
  - 70%
  - 60%
  - 50%
14. Discontinuous chips are produced when machining
- most ductile materials, such as wrought iron, copper, etc.
  - ductile materials at very low speeds and high feeds\*
  - with high friction between the chip and the tool
  - mild steel
  - none of the above

15. The chips produced during orthogonal cutting operation are
  - a. spiral \*
  - b. snarled
  - c. needles
  - d. conical helical
  - e. elemental
16. The built up edge is formed in the slow speed machining of certain ductile materials. Speed of built up edge can be reduced by
  - a. application of a lubricant
  - b. increase in feed
  - c. increase in initial hardness of the workpiece material
  - d. decrease in the rake angle
  - e. all of the above \*
17. The metal cutting wedge is fundamental to the geometry of
  - a. hand tools
  - b. power driven tools
  - c. lathe, shaper and planer tools
  - d. grinding wheels
  - e. all cutting tools \*
18. The point angle of twist drill to drill holes in steel is
  - a.  $90^\circ$
  - b.  $105^\circ$
  - c.  $118^\circ$  \*
  - d.  $135^\circ$
  - e.  $148^\circ$
19. Continuous chips are formed when cutting
  - a. brittle materials
  - b. ductile materials \*
  - c. amorphous plastic materials
  - d. free cutting non ferrous alloys only
  - e. with high speed steel tools
20. The rake angle of a cutting tool
  - a. controls the chip formation \*
  - b. prevents ribbing
  - c. determines the profile of tool
  - d. determines whether the cutting action is oblique or orthogonal
  - e. increases tool life
21. Which of the following processes is chip removing process
  - a. sintering
  - b. extrusion
  - c. forging
  - d. rolling
  - e. broaching \*
22. A twist drill has its point thinned in order to
  - a. reduce the hole diameter
  - b. increase the rake angle
  - c. locate in the centre punch mark
  - d. reduce the axial (feed) pressure \*
  - e. increase the hole diameter
23. A reamer is used to correct the
  - a. size and roundness of a drilled hole \*
  - b. size and position of a drilled hole
  - c. finish and position of a drilled hole
  - d. finish and depth of a drilled hole
  - e. all of the above
24. An oversize hole is produced by a drill if
  - a. lips of drill are of unequal length \*
  - b. feed is too high
  - c. insufficient coolant is used
  - d. cutting speed is too high
  - e. drill is hot
25. State whether the following statements are true or false
  - a. The rates of feeds and cutting for twist drill are lower than for most other machining operations
  - b. Like any other cutting tool the twist drill must be provided with correct tool angles
  - c. A twist drill produces a hole of fine finish and accurate size \*
  - d. No cutting fluids are used for carbide tipped milling cutters
  - e. Decreasing wedge angle of tool decreases its mechanical strength
26. Discontinuous chips are produced when machining
  - a. brittle materials at slow cutting speeds \*
  - b. Ductile materials with fine feed
  - c. Mild steel with sharp cutting edge of tool
  - d. Mild steel with high cutting speed
  - e. None of the above
27. Built up chips are produced when machining
  - a. Ductile materials and high depth of cut
  - b. Ductile materials with coarse feed
  - c. Mild steel with low rake angle
  - d. All of the above \*
  - e. None of the above
28. Friction between chip and tool may be reduced by
  - a. increased sliding velocity \*
  - b. increased shear angle
  - c. use of low tool finish
  - d. decreased sliding velocity
  - e. decreasing shear angle
29. Pick up the true statement
  - a. Selection of grinding wheel does not depend on the work piece material
  - b. Fine grain wheels are used to grind soft ductile materials
  - c. Hard and brittle materials and finishing cuts require dense structure in grinding wheel \*
  - d. Grade of grinding wheel is denoted by a number
  - e. Structure of grinding wheel is denoted by alphabets

30. Pick up the false statement
- Machinability index implies the degree of easiness in machining
  - Free cutting steel cannot be easily machined \*
  - Heat resisting steels possess low machinability
  - cast iron does not permit as high a cutting speed as structural carbon steel
  - Aluminium oxide abrasives are used for grinding high strength tensile materials and silicon carbide for low tensile strength materials
31. Pick up the false statement
- The most machinable metal is one which permits fastest removal of largest amount of material per grind of the tool
  - For the same amount of applied force orthogonal cutting removes more metal \*
  - For the same amount of metal removal the shear stress induced in orthogonal cutting is more than in oblique cutting
  - In oblique cutting the edge of the tool remains inclined to the direction of the work feed
  - Magnesium alloys exhibit excellent machinability
32. Pick up the false statement
- A cutting fluid should have low conductivity \*
  - Use of cutting fluids promotes a better surface finish
  - Solid lubricants normally used are graphite, molybdenum disulphide, stick waxes etc.
  - Air, CO<sub>2</sub> and argon are used as gaseous cutting fluid
  - Synthetic coolant is used for turning titanium
33. Pick out the true statement
- The structure of a grinding wheel indicates the relative spacing of grains in the wheel \*
  - The grade of a grinding wheel indicates the relative spacing of grains in the wheel
  - The grade of a grinding wheel indicates the relative strength of the bond which hold the abrasive grains in place
  - For grinding softer materials fine grain size is used
  - Coolant is not required during super finishing
34. Tick out the true statement
- In general the surface finish becomes poor with increase in cutting speed
  - An increase in back rake angle of a cutting tool deteriorates surface finish
  - Some degree of roughness which may be extremely small is always present on any machined surface \*
  - mild steel is the most commonly used material for slide ways
  - Spindles of machine tool are generally made solid
35. Pick the odd one out
- Twist drill
  - Grinding wheel
  - Parting tool in lathe \*
  - Milling cutter
  - Reamer
36. Which is the material not grinded by silicon carbide abrasive
- bronze
  - cast iron
  - copper
  - steel \*
  - non-metallic materials
37. The size of abrasive grains in abrasive jet machining varies from
- 60 to 100 microns
  - 10 to 50 microns \*
  - 1 to 5 microns
  - 0.1 to 1 micron
  - 0.01 to 1 micron
38. The condition for the formation of continuous chips with built up edges
- low rake angle
  - low cutting speed
  - high feed
  - all of the above \*
  - none of the above
39. A hard grade grinding wheel is suitable for grinding
- Hard materials
  - Soft materials \*
  - Both hard and soft materials
  - Tough materials
  - Brittle materials
40. Ceramics tools are sintered or hot-pressed from aggregates which are basically
- tungsten carbide
  - cobalt, chromium and tungsten
  - silicon carbide
  - aluminium oxide \*
  - diamond dust
41. Tick the odd one out
- combination set
  - bevel protractor
  - sine bar
  - straight edge \*
  - dividing head
42. Which of the following is not direct reading type measuring instrument
- telescoping gauge \*
  - micrometer
  - bevel protractor
  - dial gauge
  - vernier caliper
43. Which of the following is not concerned with plane surface measurement
- straight edge
  - surface gauge
  - profilometer
  - optical flat
  - combination set \*

44. Pick up false statement about various elements of drill
- a drill cuts only at the lip
  - the dead centre does no cutting, it merely rubs on the work, creating friction, heat and inaccuracy
  - flute is provided for the purpose of ejecting chips and most drills have three flutes \*
  - the margin supports the drill in the hole and helps to guide it
  - body clearance gives strength to the drill
45. The property of a material which enables it to be drawn into wires with the application of tensile force, is called
- plasticity
  - elasticity
  - ductility \*
  - malleability
46. Which of the following material has the maximum ductility ?
- Mild steel \*
  - Copper
  - Zinc
  - Aluminium
47. The plasticity is the property of a material which enables it to
- regain its original shape after deformation when the external forces are removed.
  - draw into wires by the application of a tensile force.
  - resist fracture due to high impact loads.
  - retain deformation produced under load permanently. \*
48. The property of a material which enables it to resist fracture due to high impact loads, is called toughness.
- True \*
  - False
49. Which of the following property is desirable in parts subjected to shock and impact loads ?
- Strength
  - Stiffness
  - Brittleness
  - Toughness \*
50. A special case of ductility which permits materials to be rolled or hammered into thin sheets, is called
- plasticity
  - elasticity
  - ductility
  - malleability \*
51. The toughness of a material ..... when it is heated.
- increases
  - decreases \*
  - does not change
52. Which of the following property is essential for spring materials ?
- Stiffness
  - Ductility
  - Resilience \*
  - Plasticity
53. The malleable material should be plastic but is not essential to be so strong.
- Agree \*
  - Disagree
54. The material commonly used for machine tool bodies is
- mild steel
  - aluminium
  - brass
  - cast iron \*
55. The shock resistance of steel is increased by adding
- nickel
  - chromium
  - nickel and chromium \*
  - cobalt and molybdenum
56. 18 / 8 steel contains
- 18% nickel and 8 % chromium
  - 18% chromium and 8% nickel \*
  - 18% nickel and 8% vanadium
  - 18% vanadium and 8% nickel
57. The material generally used for air-craft components is
- mild steel
  - high speed steel
  - stainless steel
  - aluminium \*
58. The choice of the right band saw blade for a particular job is determined by the
- blade set
  - straddling speed
  - type of material to be cut \*
  - blade temper
  - amount of material to be removed
59. Under what conditions do band saws cut best ?
- high speed and light feed
  - high speed and heavy feed
  - slow speed and light feed
  - slow speed and heavy feed \*
  - none of the above
60. Which of the following is/are affected by the number of teeth a saw blade has
- rate of feed
  - coarseness of cut
  - size of cut
  - all of the above \*
  - none of the above
61. The purpose of chasing dial on lathes is to achieve
- taper turning
  - cutting of tapered threads
  - cutting of multiple threads
  - plunge cut
  - picking up the thread accurately at the beginning of each cut \*
62. A good lubricant for thread-cutting operation is
- graphite
  - white lead
  - mineral lard oil \*
  - water soluble oil
  - emulsified oil
63. The power is transmitted by lead screw to the carriage through
- gear box
  - worm and gear
  - rack and pinion
  - half nut \*
  - apron mechanism
64. No lubricant is required when cutting threads in
- tungsten carbide
  - mild steel
  - titanium
  - brass or cast iron \*
  - high speed steel

65. The following type of file is preferred for filing brass or bronze
- the smooth-cut file
  - the second-cut file
  - the coarse -cut or rough-cut file \*
  - the double-cut file
  - the single-cut file
66. To clean a file, it is
- dipped in water
  - dipped in dilute alcohol
  - rubbed on stone
  - rubbed on wood
  - cleaned with a file card \*
67. A power saw which employs a continuous looped blade driven by two wheels is known as
- a power hacksaw machine
  - a circular saw machine
  - a filing machine
  - a band saw machine \*
  - none of the above
68. Average cutting speed in machining mild steel by single point tool of H.S.S. is
- 10 m/mt
  - 20 m/mt
  - 30 m/mt \*
  - 40 m/mt
  - 50 m/mt
69. Tool life is said to be over if
- a poor surface finish is obtained
  - sudden increases in power and cutting force with chattering take place
  - overheating and furning due to friction start
  - all of the above \*
  - it can no longer machine
70. Tool life is most affected by machine
- cutting speed \*
  - tool geometry
  - feed and depth
  - microstructure of material being cut
  - not using coolant and lubricant
71. The spindle speeds of machine tools are usually designed to follow
- arithmetical progression
  - geometrical progression \*
  - harmonical progression
  - logarithmic progression
  - random number theory
72. The best machine for mass production of watch components machined from bar will be
- turret lathe
  - capstan lathe
  - tool room lathe
  - numerically controlled lathe
  - multi spindle automatic lathe \*
73. The common ratio  $\phi$  for spindle speeds in geometrical progression is taken between
- 0.2 to 0.6
  - 0.6 to 1.0
  - 1.0 to 2.0 \*
  - 2.0 to 5.0
  - 5.0 to 10.0
74. The spindle speeds in a cutting tool are 160, 229, 328, 496... The next higher speed will be
- 642
  - 660
  - 671 \*
  - 695
  - 709
75. For machining a casting on a lathe, it should be held in
- collet chuck
  - magnetic chuck
  - three-jaw chuck
  - four-jaw chuck \*
  - face plate
76. In automatic machine where large number of components are machined from a bar, it is held in
- collect chuck \*
  - magnetic chuck
  - three-jaw chuck
  - three-jaw chuck
  - face plate
77. Turret lathes in which long turning cuts are made by moving the saddle along the bedways of the machine are called
- drum type turret lathes
  - ram type turret lathes
  - saddle type turret lathes \*
  - automatic screw machines
  - universal turret lathes
78. The purpose of tumbler gears in lathe is to
- cut gears
  - cut threads
  - reduce spindle speed
  - give desired direction of movement to the lathe carriage \*
  - reverse spindle rotation
79. Turret lathes equipped with spindles which can be fitted with a universal 2-jaw chuck are referred to as
- drum type machines
  - saddle type machines
  - chucking machines \*
  - universal lathes
  - swiss type lathes
80. On bar-type turret lathes, work to be machined is gripped in
- three-jaw chucks
  - four-jaw chucks
  - pneumatic chucks
  - collet \*
  - magnetic chucks

81. Flank wear occurs mainly on
- nose part, from relief face and side relief face \*
  - nose part and top face
  - cutting edges
  - all of the above
  - front force
82. In a capstan lathe, the turret is mounted on
- a short slide of ram sliding on the saddle \*
  - the saddle sliding on the bed
  - compound rest
  - back tool post
  - head stock
83. Which of the following properties are essential for a tool material used for high speed machining
- red hardness and impact resistance
  - red hardness and wear resistance
  - toughness and impact resistance
  - impact resistance and wear resistance
  - red hardness, wear resistance and toughness \*
84. The characteristics that enables one material to cut another is its relative
- toughness
  - hardness \*
  - resilience
  - ductility
  - creep and fatigue properties
85. Most machinable metal is one which
- produces discontinuous chips
  - permits maximum metal removal per tool grind \*
  - results in minimum length of shear plane
  - results in minimum value of shear angle
  - all of the above
86. It is possible to correlate tool life with the following property of the metal
- grain size
  - toughness
  - hardness \*
  - microconstituent
  - alloying elements
87. Sanding is a process of removing metal surfaces or wood fibers by
- filing
  - sawing
  - cutting \*
  - planing
  - none of the above
88. Sanding belts are made of cloth, coated with various grades of
- sand
  - gravel
  - copper oxide
  - aluminium oxide \*
  - diamond
89. The metal in machining operation is removed by
- teraing chips
  - distortion of metal
  - shearing the metal across a zone \*
  - cutting the metal across a zone
  - pushing the metal with tool
90. Average cutting speed in machining cast iron by a single point cutting tool of H.S.S. is
- 6 m/mt
  - 11 m/mt
  - 22 m/mt \*
  - 33 m/mt
  - 44 m/mt
91. Galvanising is
- a zinc diffusion process
  - an oxidising process used for aluminium and magnesium articles
  - a process used for making thin phosphate coatings on steel to act as a base or primer for enamels and paints
  - is the process of coating of zinc by hot dipping \*
  - none of the above
92. The C.L.A. value is used for measurement of
- metal hardness
  - surface roughness \*
  - surface dimensions
  - sharpness of tool edge
  - machinability
93. The front rake required to machine brass by H.S.S. tool is
- $15^{\circ}$
  - $10^{\circ}$
  - $5^{\circ}$
  - $0^{\circ}$  \*
  - $-5^{\circ}$
94. The best all-round coolant for carbide tools is
- soluble oil in plenty \*
  - kerosene
  - turpentine oil
  - compressed air
  - soap water
95. Work which cannot be chucked because of its shape can be mounted on the following device for facing operation
- collet
  - vise
  - V-block
  - faceplate \*
  - universal head
96. A left hand tool on lathe cuts most efficiently when tool travels
- from left to right end of lathe bed \*
  - from right to left end of the lathe bed
  - across bed
  - at angular position
  - for cutting threads

97. A right hand tool on lathe cuts most efficiency when tool travels
- from left to right end of lathe bed
  - from right to left end of lathe bed \*
  - across bed
  - at angular position
  - for cutting threads
98. Which one of the lathe parts mentioned below is not provided with a power feed ?
- carriage
  - compound rest \*
  - cross slide
  - feed screw
  - lead screw
99. Before hardness steel can cut, it must be
- annealed
  - heat treated
  - forged
  - hardened
  - shaped into a cutting edge \*
100. Anodising is
- a zinc diffusion process
  - an oxidising process used for aluminium and magnesium articles \*
  - a process used for making thin phosphate coatings on steel to act as a base or primer for enamels and paints
  - is the process of coating of zinc by hot dipping
  - none of the above
101. Undercutting is the operation of cutting
- below the specified size
  - a deep groove
  - a spiral
  - a groove next to shoulder \*
  - with high depth of cut
102. Which of the following taper turning methods can be used only for turning external taper
- form fool
  - tailstock offset \*
  - taper attachment
  - compound rest
  - all of the above
103. The following gauge is used for checking of holes
- ring gauge
  - snap gauge
  - plug gauge \*
  - dial gauge
  - micrometer screw gauge
104. If a  $25^\circ$  taper is to be cut with small diameter towards tail stock the setting of taper turning attachment would be
- $+25^\circ$
  - $-25^\circ$
  - $-12.5^\circ$
  - $+12.5^\circ$  \*
  - $+50^\circ$
105. Chisels for metal cutting are hardened
- at tip
  - all over \*
  - at the cutting edge
  - rarely
  - at the top
106. The cutting angle of chisel for cutting mild steel is
- $30^\circ$
  - $50^\circ$
  - $70^\circ$  \*
  - $90^\circ$
  - $110^\circ$
107. If the diameter of a job being machined on lathe is doubled and speed is halved, the cutting time will be
- same
  - half
  - double
  - four times \*
  - eight times
108. Short or sharp angle tapers are machines using
- a taper attachment
  - the compound rest \*
  - the tailstock set over method
  - a form tool ground to the taper angle
  - morse taper attachment
109. The taper on lathe spindle is
- 1 : 10
  - 1 : 12
  - 1 : 15
  - 1 : 20 \*
  - 1 : 24
110. The angle between the lathe centres is
- 1 : 10
  - 1 : 12
  - 1 : 15
  - 1 : 20 \*
  - 1 : 24
111. The movement of the various slides as well as the feeding of the stock is entirely automatic on screw machines and is obtained by the action of
- gear
  - collet
  - roller
  - spring
  - cam \*
112. The slowest speed in lathe is adopted for following operation
- normal turning
  - thread turning \*
  - turning big diameter
  - taper turning
  - knurling
113. Square or irregular shaped work piece for turning is usually mounted in
- three jaw chuck
  - independent chuck \*
  - collet chuck
  - bar chuck
  - mandrel

114. The lathe spindle at the nose end has  
 a. internal threads      b. external threads \*  
 c. taper threads      d. no threads  
 e. snap threads
115. A device which is fastened to the headstock end of the work to be turned between centres is called a  
 a. face plate      b. lathe dog \*  
 c. vise      d. work steady  
 e. independent chuck
116. The included angle of lathe centre is  
 a.  $30^\circ$       b.  $45^\circ$   
 c.  $60^\circ$  \*      d.  $90^\circ$   
 e.  $120^\circ$
117. The taper in lathe spindle is  
 a. 1 : 10      b. 1 : 12  
 c. 1 : 15      d. 1 : 20 \*  
 e. 1 : 30
118. Tail stock centres which do not revolve with the work piece are known as  
 a. non-revolving centres  
 b. dead centres \*  
 c. live centre  
 d. independent centres  
 e. magnetic centres
119. The type of the chip produced when cutting cast iron is  
 a. continuous  
 b. discontinuous \*  
 c. with built up edge  
 d. any one of the above depending on other factors  
 e. none of the above
120. Best coolant and lubricant for steel and wrought iron is  
 a. water soluble oils or sulphur-based and mineral oils \*  
 b. mineral an fatty oils  
 c. soluble oils  
 d. dry  
 e. none of the above
121. Crater wear occurs mainly due to following phenomena  
 a. abrasion      b. diffusion \*  
 c. oxidation      d. adhesion  
 e. all of the above
122. Chips with built up edge can be expected when machining  
 a. hard material      b. brittle material  
 c. tough material      d. ductile material \*  
 e. none of the above
123. With H.S.S. tools, highest cutting speed is used while machining  
 a. cast iron      b. mild steel  
 c. brass      d. bronze  
 e. aluminium \*
124. In machining, chips break due to  
 a. plasticity  
 b. ductility  
 c. toughness  
 d. work hardening \*  
 e. tearing of the work material
125. When machining a hard and brittle metal like cast iron, the type of chips produced is  
 a. continuous chip  
 b. discontinuous chip \*  
 c. continuous chip with built-up edge  
 d. no chips are produced  
 e. fine chips
126. The following type of chip is produced when machining ductile materials  
 a. continuous chip \*  
 b. discontinuous chip  
 c. continuous chip with built-up edge  
 d. no chips are produced  
 e. fine chips
127. The advantage of positive rake angles on cutters is that these  
 a. use less power  
 b. have less cutting pressure  
 c. generate less heat  
 d. work well on soft and ductile materials  
 e. all of the above \*
128. The following cutting fluid is used with carbide tools  
 a. kerosene oil  
 b. lard oil  
 c. water  
 d. water with oil  
 e. no cutting fluid \*
129. The sector arm in indexing head is so adjusted that the number of holes between the bevelled edges is equal to  
 a. no. of holes to be indexed  
 b. no. of holes to be indexed +1 \*  
 c. no. of holes to be indexed -1  
 d. no. of holes to be indexed +2  
 e. no. of holes to be indexed -2
130. How many degrees of the movement is produced by one complete turn of the index crank  
 a.  $360^\circ$       b.  $90^\circ$   
 c.  $45^\circ$       d.  $9^\circ$  \*  
 e.  $1^\circ$
131. Crater wear takes place in a single point cutting tool at  
 a. flank  
 b. side rake  
 c. face \*  
 d. tip  
 e. none of the above



132. Best cooling and lubricant for cast iron is  
 a. water soluble oils or sulphur based and mineral oils  
 b. mineral and fatty oils  
 c. soluble oils  
 d. dry \*  
 e. none of the above
133. Which of the following tool materials has highest cutting speed  
 a. carbon steel                      b. tool steel  
 c. HSS                                      d. cast alloy  
 e. carbide \*
134. 18-4-1 high speed steel contains following elements in the ratio of 18-4-1  
 a. tungsten (W), chromium (Cr) and vanadium (V) \*  
 b. Cr, V, W  
 c. W, Mn, Cr  
 d. W, V, Cr  
 e. W, Cr, Mn
135. Approximately content of Vanadium in H.S.S. cutting tool material is  
 a. 16%                                      b. 4%  
 c. 0.1%                                      d. 1% \*  
 e. 8%
136. Tungsten content in the High Speed Steel cutting tool material is  
 a. 18% \*                                      b. 4%  
 c. 1%                                              d. 0.6%  
 e. 16%
137. Chromium is H.S.S. cutting tool material is  
 a. 1%                                              b. 4% \*  
 c. 18%                                              d. 0.6%  
 e. 16%
138. The main function of the cutting fluid is  
 a. provide lubrication  
 b. cool the tool and work piece \*  
 c. wash away the chips  
 d. improve surface finish  
 e. all of the above
139. Friction between chip and tool can be reduced by  
 a. increasing rake angle  
 b. increasing shear angle  
 c. increasing depth of cut  
 d. increasing sliding velocity \*  
 e. using coolant
140. For the same amount of metal removal, the shear stress induced in orthogonal cutting as compared to oblique cutting is  
 a. more \*  
 b. less  
 c. equal  
 d. may be more or less depending on speed and cutting conditions  
 e. there is no such correlation
141. The increase in back rake angle would affect the surface finish as follows  
 a. improve \*  
 b. deteriorate  
 c. unchanged  
 d. improve/deteriorate depending on metal  
 e. there is no such correlation
142. Which of the following is used as cutting fluid for the turning and milling operation on alloys steels  
 a. CO<sub>2</sub>  
 b. kerosene  
 c. soluble oil  
 d. heavy water  
 e. sulphurised mineral oil \*
143. Continuous chips will be formed when machining speed is  
 a. high \*  
 b. low  
 c. medium  
 d. irrespective of cutting speed  
 e. away from the design value
144. Which of the following is the chip removal process  
 a. rolling                                      b. extruding  
 c. die casting                                      d. broaching \*  
 e. forging
145. Ceramic tools are made from  
 a. tungsten oxide  
 b. silicon carbide  
 c. cobalt  
 d. aluminium oxide \*  
 e. diamond sand
146. Discontinuous chips will be formed when machining speed is  
 a. high  
 b. low \*  
 c. medium  
 d. irrespective of cutting speed  
 e. away from the design value
147. The heat generated in metal cutting can be conveniently determined by  
 a. installing thermocouple on tool  
 b. installing thermocouple on job  
 c. using radiation pyrometer  
 d. calorimetric set up \*  
 e. infra-red techniques
148. Poor surface finish results due to  
 a. heavy depth of cut  
 b. low cutting speed  
 c. high cutting speed  
 d. coarse feed \*  
 e. low side rake angle

149. Large jobs on shaper are held with the help of
- vise
  - clamps and T-bolts
  - magnetic vise
  - clamps, bolts and squares \*
  - on floor directly
150. For proper seating of the work in a shaper vise for machining, the work should be supported on
- jaws
  - clamps
  - shims
  - parallels \*
  - flats
151. Flat thin work is held on planer by
- C-clamp and angle plate
  - toe dogs and stops \*
  - clamping stops
  - poppets and toe dogs
  - magnetic vise
152. Cylindrical parts are held on planer by
- V-blocks and arrestors
  - angle plates
  - V-block, T-block and clamps \*
  - T-bolt and clamps
  - magnetic vise
153. The feeding of the job in a shaper is done by
- movements of the clapper box
  - table movement \*
  - V-block
  - ram movement
  - tool movement
154. In the case of a shaping machine, feeding of the job is done
- at the beginning of the cutting stroke
  - at the middle of the cutting stroke
  - at the end of the cutting stroke
  - at the end of the return stroke \*
  - any where
155. In the case of a shaper equipped with whitworth mechanism
- the cutting stroke is faster than the return stroke
  - the return stroke is faster than the cutting stroke \*
  - both the cutting stroke and the return stroke take the same time
  - the return stroke is slower than the cutting stroke
  - none of the above
156. The cutting speed of the tool in a mechanical shaper is
- maximum at the beginning of the cutting stroke
  - maximum at the end of the cutting stroke
  - maximum at the middle of the cutting stroke \*
  - minimum at the middle of the cutting stroke
  - uniform throughout the cutting stroke
157. Size of shaper is specified by
- length of strike \*
  - size of table
  - maximum size of tool
  - ratio of forward to return stroke
  - h.p. of motor
158. A shaper employs following for quick return motion
- whitworth mechanism
  - crank and slotted link mechanism
  - hydraulic mechanism
  - any one of the above \*
  - Leonard mechanism
159. To prolong the life of shaper tools after they are ground, they should be
- lapped \*
  - sanded
  - stoned
  - hardened
  - heat treated
160. Which of the following work holding device is preferred for shaping a key-way in a cylindrical shaft
- a V-block \*
  - an angle plate
  - a dividing head
  - a shaper vise
  - any one of the above
161. Which of the following is not the part of a shaper
- lapper box
  - ram
  - table
  - tool head
  - cross slide \*
162. To shape splines in a shaft which must be accurately spaced, the work is mounted in
- a shaper vise
  - between indexing centres \*
  - V-blocks
  - a special fixture
  - an independent chuck
163. Which of the following is non-chip removal process
- spinning on lathe \*
  - milling
  - thread cutting
  - gear hobbing
  - grinding
164. Size of planer is specified by
- size of table
  - stroke length
  - size of table and height of cross rail \*
  - n. of tools which operate at a time
  - h.p. of motor
165. Pick up the incorrect statement about plano-miller
- feed is given by moving the table
  - in comparison to planning machine the table movement is slower
  - used for production of large surface
  - cutting can be done on three sides of the work at the same time
  - cutting can be done on one side only at a time \*

166. Too low a feed rate in a milling operation would
- consume less power
  - improve surface finish
  - cause the cutter to rub and scrap the surface of the work instead of cutting and dull the tool quickly \*
  - be best suited while milling harder materials
  - be best suited while milling softer materials
167. Feed rate in milling operation is equal to
- RPM
  - RPM  $\times$  No. of teeth
  - RPM  $\times$  Feed per tooth  $\times$  No. of teeth \*
  - $\frac{\text{RPM} \times \text{Feed per tooth} \times \text{No. of teeth}}{2}$
  - none of the above
168. Depth of finishing cut on milling machine is of the order of
- 0.01 to 0.1 mm
  - 0.01 to 0.3 mm
  - 0.4 to 0.8 mm \*
  - 0.8 to 1.2 mm
  - 1.2 to 2 mm
169. Light duty face mills are used in finishing operations and compared to heavy duty face mills, these have
- more no. of teeth
  - less no. of teeth \*
  - same no. of teeth
  - there is no such criterion
  - none of the above
170. Addition of lead, sulphur and phosphorous to low carbon steels helps in achieving
- better surface quality
  - reduction of built up edge
  - breaking up of chips
  - all of the above \*
  - none of the above
171. The difference between planer and shaper is that in former case
- tool moves over stationary work
  - tool moves over reciprocating work
  - tool can machine internal as well as external details
  - both tool and job reciprocate
  - tool is stationary and job reciprocates \*
172. The cut per tooth while broaching steel in a key way broach is of the order of
- 0.01 to 0.05 mm
  - 0.05 to 0.20 mm \*
  - 0.001 to 0.01 mm
  - 0.02 to 0.08 mm
  - 0.1 to 0.3 mm
173. Internal and external threads can be produced on tapered surfaces conveniently by
- universal milling machine
  - plano miller
  - planetary milling machine \*
  - rotary table milling machine
  - lathe
174. Best coolant and lubricant for aluminium is
- water soluble oils or sulphur based and mineral oils
  - mineral and fatty oils or soluble oils \*
  - soluble oils
  - dry
  - none of the above
175. Non-ferrous cast tool steel operates best at
- cold temperature
  - high temperature of 500°C
  - temperature has no effect
  - elevated temperatures of 825°C and lose efficiency if operated at cold temperature \*
  - none of the above
176. Carbide tool bits are ground by following type of grinding wheel
- aluminium oxide
  - silicon carbide \*
  - diamond
  - cobalt
  - high speed steel
177. Powder metallurgy techniques are used in the production of
- high carbon tool steels
  - HSS tools
  - tungsten carbide tools
  - twist drills \*
  - ceramics
178. Which of the following abrasive is the hardest
- Al<sub>2</sub>O<sub>3</sub> (Aluminium Oxide) \*
  - Si C (Silicon Carbide)
  - B<sub>4</sub>C (Boron Carbide)
  - CBN (Cubic Boron Nitride)
  - diamond
179. The hardness of carbon tool steels is increased when alloyed when alloyed with
- tungsten
  - chromium and vanadium \*
  - silicon
  - manganese
  - sulphur
180. High speed steel tool material contains carbon
- 0.6-1.0% \*
  - 2-4%
  - 4-6%
  - 6-10%
  - 10-12%
181. The binding material used in cemented carbide tools is
- graphite
  - lead
  - cobalt \*
  - carbon
  - nickle
182. The cutting speed will be machining the following material with H.S.S. tool
- aluminium
  - brass
  - copper
  - white metal
  - cast iron \*

183. When the point of a twist drill is sharpened, the lips must be ground so that they have
- equal dead centre
  - deep flutes
  - wide web
  - proper point
  - equal length and angle \*
184. The hardest manufactured cutting tool material is
- diamond
  - high speed steel
  - ceramic
  - carbon steel
  - cemented carbide \*
185. The type of chip produced when cutting ductile material is
- continuous \*
  - discontinuous
  - with built up edge
  - any one of the above depending on other factors
  - none of the above
186. Depth of cut of finish grinding of steel in surface grinder is of the order of
- 0.001 to 0.005 mm
  - 0.005 to 0.01 mm \*
  - 0.01 to 0.5 mm
  - 0.5 to 0.1 mm
  - 0.1 to 0.5 mm
187. The point of a twist drill is thinned in order to
- decrease the rake angle
  - increase the rake angle
  - reduce the hole diameter
  - reduce the axial feed pressure \*
  - locate in the centre punch mark
188. For drilling operation, the cylindrical job should always be clamped on a
- collet
  - socket
  - jaw
  - vise
  - V-block \*
189. Drilling is an example of
- simple cutting
  - uniform cutting \*
  - orthogonal cutting
  - oblique cutting
  - intermittent cutting
190. The cutting edges of a standard twist drill are called
- flutes
  - lips
  - wedges
  - flanks \*
  - conical points
191. Trepanning is an operation of
- cutting internal threads
  - producing a hole by removing metal along the circumference of a hollow cutting tool \*
  - making a cone-shaped enlargement of the end of a hole
  - super finishing
  - coating metal for wear resistance
192. The helical grooves which extend to the full length of the drill body are called
- lips
  - cutting edges
  - margins
  - flutes \*
  - shanks
193. The angle formed by the leading edge of the land with a plane having the axis of the drill is known as
- helix angle or rake angle \*
  - point angle
  - lip-clearance angle
  - chisel edge angle
  - primary angle
194. The number of helical grooves which are present in a standard twist drill is usually
- one \*
  - two
  - three
  - four
  - five
195. A standard ground drill has a point angle of
- 90°
  - 100°
  - 118° \*
  - 120°
  - 130°
196. Goose neck tools are preferred on planers and slotters because
- digging in and scoring of the work is minimum \*
  - large clearance angle are possible
  - friction between flank and machined surface is less
  - tool is very rigid
  - back rake is appropriate
197. For harder materials, the point angle of drill is
- increased \*
  - decreased
  - kept at 118°
  - point angle has nothing to do with type of material
  - none of the above
198. For ferrous materials, the helix angle of drill is taken as
- 30° \*
  - 45°
  - 60°
  - 90°
  - none of the above
199. The commonly used value of feed while machining mild steel on shaper with HSS tool is of the order of
- 0.1 mm
  - 0.5 mm
  - 1.0 mm
  - 1.5 mm \*
  - 3.0 mm
200. The cutting speed of high speed twist drill to machine grey cast iron is
- 10-20 m/mt
  - 25-40 m/mt \*
  - 50-80 m/mt
  - 100-160 m/mt
  - 180-240 m/mt

201. Optimum rake angle of a tool is a function of  
 a. cutting speed  
 b. cutting tool material  
 c. properties of work material \*  
 d. cutting conditions, i.e. dry or lubricant  
 e. feed and depth of cut
202. The back rake angle of HSS single point cutting tool for machining brass is  
 a.  $10^{\circ}$   
 b.  $-5^{\circ}$   
 c.  $0^{\circ}$  \*  
 d.  $5^{\circ}$   
 e.  $7^{\circ}$
203. The recommended value of rake angle for machining aluminium with diamond tool is  
 a.  $0^{\circ}$  \*  
 b.  $5^{\circ}$   
 c.  $15^{\circ}$   
 d.  $25^{\circ}$   
 e.  $35^{\circ}$
204. The angle between the face of tool, and the line tangent to the machined surface at the cutting point is known as  
 a. rake angle  
 b. lip angle  
 c. clearance angle  
 d. cutting angle \*  
 e. nose angle
205. The angle between the tool face and the ground end surface of flank is known as  
 a. lip angle \*  
 b. rake angle  
 c. clearance angle  
 d. cutting angle  
 e. nose angle
206. The recommended value of rake angle for machining aluminium with high speed steel tool is  
 a.  $0^{\circ}$   
 b.  $5^{\circ}$   
 c.  $15^{\circ}$   
 d.  $25^{\circ}$   
 e.  $35^{\circ}$  \*
207. The angle between the face of the tool and the plane parallel to the base of the cutting tool is called  
 a. rake angle \*  
 b. cutting angle  
 c. clearance angle  
 d. lip angle  
 e. nose angle
208. The recommended value of rake angle for machining aluminium with cemented carbide tool is  
 a.  $0^{\circ}$   
 b.  $5^{\circ}$   
 c.  $15^{\circ}$  \*  
 d.  $25^{\circ}$   
 e.  $35^{\circ}$
209. The normal back rake angle of carbide single point cutting tool for machining aluminium is of the order of  
 a.  $-5^{\circ}$  to  $0^{\circ}$   
 b.  $0$  to  $5^{\circ}$  \*  
 c.  $0$  to  $10^{\circ}$   
 d.  $10$  to  $15^{\circ}$   
 e.  $10$  to  $20^{\circ}$
210. For softer material, the point angle of drill is  
 a. increased  
 b. decreased \*  
 c. kept at  $118^{\circ}$   
 d. point angle has nothing to do with type of material  
 e. none of the above
211. The metal cutting wedge is fundamental to the geometry of  
 a. hand tools  
 b. power driven tools  
 c. lathe tools  
 d. sheet metal cutting tools  
 e. all of the above \*
212. The tool life of a single point cutting tool with increase in back rake angle, with other parameters constant, will  
 a. increase slightly \*  
 b. decrease slightly  
 c. remain unchanged  
 d. increase tremendously  
 e. decrease tremendously
213. Tool signature is  
 a. there is nothing like tool signature  
 b. a numerical method of identification of tool \*  
 c. the plan of tool  
 d. the complete specification of tool  
 e. none of the above
214. Tool signatures comprise  
 a. 4 elements  
 b. 5 elements  
 c. 6 elements  
 d. 7 elements \*  
 e. 8 elements
215. In metal cutting at speed above 20 rpm, maximum heat is carried by  
 a. work  
 b. tool  
 c. chip \*  
 d. equally by all of the above  
 e. none of the above
216. The cutting force with increase in nose radius of a single point cutting tool will  
 a. increase slightly  
 b. decrease slightly \*  
 c. remain unchanged  
 d. increase considerably  
 e. decrease considerably
217. The rake angle of a cutting tool  
 a. determines the profile of tool  
 b. prevents rubbing  
 c. decides the type of cutting action  
 d. controls the chip formation \*  
 e. weakens the tool
218. Which of the following is the example of oblique cutting  
 a. slotting  
 b. broaching  
 c. knife turning  
 d. all of the above  
 e. none of the above \*

219. Side rake angle of a single point tool is the angle
- by which the face of the tool is inclined sideways\*
  - by which the face of the tool is inclined towards back
  - between the surface of the flank immediately below the point and a line drawn from the point perpendicular to the base
  - between the surface of the flank immediately below the point and a plane at right angles to the centre line of the point of the tool
  - none of the above
220. The recommended value of rake angle for machining brittle materials like brass is
- $-15^\circ$
  - $-5^\circ$
  - $0^\circ$  \*
  - $+10^\circ$
  - $+20^\circ$
221. In orthogonal cutting system, the cutting edges is
- in line with direction of tool travel
  - perpendicular to direction of tool travel \*
  - perpendicular to shear plane
  - perpendicular to direction of depth of cut
  - none of the above
222. Stellite is the trade name for
- ceramics
  - ferrous cast alloys
  - cemented carbide
  - products manufactured by powder metallurgy techniques
  - non-ferrous cast alloys \*
223. No cutting fluid is normally used while machining
- mild steel
  - carbon steel
  - stainless steel
  - aluminium
  - cast iron \*
224. Pick up the incorrect statement about ceramic cutting tools
- it is available in the form of tips
  - it is made by cold pressing techniques
  - it consists of silicon \*
  - it consists of  $Al_2O_3$
  - it cannot be reground
225. Throw away tips are used because
- initial cost is low \*
  - tool changing is easier
  - regrinding is not required
  - all of the above
  - none of the above
226. Back rake angle for HSS single point cutting tool is machine free cutting brass is
- $0^\circ$
  - $5^\circ$
  - $10^\circ$
  - $15^\circ$  \*
  - $-15^\circ$
227. The portion of the tool on which cutting edge is formed is called
- flank
  - side
  - face
  - nose
  - shank \*
228. The angle between the side cutting edge and the end cutting edge is known as
- nose angle \*
  - clearance angle
  - side relief angle
  - end cutting edge angle
  - end relief angle
229. Lip angle of a single point tool is of the order of
- $10-20^\circ$
  - $30-45^\circ$
  - $50-60^\circ$
  - $60-80^\circ$  \*
  - $80-100^\circ$
230. A reamer is used to correct the
- size and position of drilled hole
  - size and roundness of hole \*
  - finish and position of drilled hole
  - finish and size of a drilled hole
  - finish and depth of a drilled hole
231. If 't' is the thickness of underformed chip in mm, " $\phi$ " is the side cutting edge angle of the single point tool and 's' the feed in mm/rev, then
- $t = s \sin \phi$  \*
  - $s = t \sin \phi$
  - $s = t \cos \phi$
  - $t = s \tan \phi$
  - $t = s \cos \phi$
232. The binding material used in cemented carbide tool is
- nickle
  - cobalt \*
  - aluminium
  - chromium
  - iron
233. Cemented carbide tools are poor in
- compression
  - tension
  - shear
  - compression and tension
  - tension and shear \*
234. Cutting speed in machining with H.S.S. tool will be maximum when machining
- cast iron
  - mild steel
  - aluminium \*
  - wrought iron
  - tough steel
235. Back rake angle of a single point tool is the angle
- by which the face of the tool is inclined sideways
  - by which the face of the tool is inclined towards back \*
  - between the surfaces of the flank immediately below the point and a line drawn from the point perpendicular to the base
  - between the surface of the flank immediately below the point and a plane at right angles to the centre line of the point of the tool
  - none of the above

236. The cutting speed for machining cast iron with a HSS tool is of the order of
- 30-50 m/mt \*
  - 60-90 m/mt
  - 100-150 m/mt
  - 160-250 m/mt
  - 250-400 m/mt
237. Which is the correct order for machinability of metals
- magnesium alloys, grey C.I., low carbon steel, monel metal \*
  - grey cast iron, low carbon steel, magnesium alloys, monel metal
  - magnesium alloys, low carbon steel, grey C.I., monel metal
  - magnesium alloys, grey C.I., monel metal, low carbon steel
  - magnesium alloys, low carbon steel, monel metal, grey C.I.
238. The angle measured in the diametral plane between the face of the tooth and a radial line passing through the tooth cutting edge of a milling cutter is known as
- rake angle \*
  - primary clearance angle
  - relief angle
  - lip angle
  - axial rake
239. For particular cutting speed, the tool materials in order of tool life are
- H.S.S. cemented carbides ceramics and oxides
  - ceramics and oxides, cemented carbides, H.S.S.\*
  - H.S.S. ceramics and oxides, cemented carbides
  - cemented carbides, ceramics and oxides, H.S.S.
  - ceramics and oxides H.S.S., cemented carbides
240. Tool cutting forces, with increase in cutting speed
- more or less remain constant
  - increase linearly
  - decrease linearly \*
  - unpredictable
  - none of the above
241. The cutting speed for milling cast iron with HSS milling cutter is of the order of
- 5-10 m/mt
  - 10-16 m/mt \*
  - 20-30 m/mt
  - 50-100 m/mt
  - 100-250 m/mt
242. End relief angle of a single point tool is the angle
- by which the face of the tool is inclined sideways
  - by which the face of the face is inclined towards back
  - between the surfaces of the flank immediately below the point and a line drawn from the point perpendicular to the base \*
  - between the surface of the flank immediately below the point and a plane at right angles to the centre line of the point of the tool
  - none of the above
243. The strength of a cutting tool depends on following angle
- lip angle
  - clearance angle
  - rake angle \*
  - cutting angle
  - all of the above
244. Chips are broken effectively due to following property
- stress
  - elasticity
  - toughness
  - work hardening of work material \*
  - ductility
245. A burr is
- short piece of hardened chip
  - burnt sand
  - rough surface on welded joint adhering to casting
  - sharp edge remaining on metal after cutting, stamping or machining \*
  - built up edge on a cutting tool
246. Cutting force and power involved in a machine tool can be measured by using
- pyrometer
  - comparator
  - transducer
  - dynamometer \*
  - gyroscope
247. An important parameter of specification of milling machine is
- size of table
  - spindle size
  - arbor size \*
  - horse power
  - table movements
248. A milling machine in which the table can be swivelled and set at any angle to the column face is called a
- plain knee-and-column type milling machine
  - universal knee-and-column type milling machine \*
  - bed-type milling machine
  - drum-type milling machine
  - planer-type milling machine
249. The cutting tool in a milling machine is mounted on
- tool holder
  - arbor \*
  - spindle
  - column
  - table
250. The chip space between the back of one tooth and the face of the next tooth in a milling cutter is called
- fillet
  - land
  - radiused edge
  - gash \*
  - tooth space
251. The operation of milling two sides of a work piece simultaneously is called
- gang milling
  - climb milling
  - square milling
  - straddle milling \*
  - end milling

252. In order to avoid dulling of cutter, climb milling operation should never be used when milling parts made of
- magnesium parts made of
  - cast iron \*
  - mild steel
  - non-ferrous materials
  - stainless steel
253. Standard milling arbor size is
- 25.4 mm
  - 27 mm
  - 32 mm
  - 31.75 mm
  - all of the above \*
254. Milling machine is classified as horizontal or vertical type, depending on the position of
- spindle \*
  - workpiece
  - milling cutter
  - work table or bed
  - knee
255. Burnishing is an operation of
- heat treatment
  - deep boring
  - gear finishing \*
  - surface treatment
  - producing gears
256. To obtain fine finish cuts in milling
- the cutting speed should be decreased and the feed increased
  - the cutting speed should be increased and the feed decreased \*
  - both the cutting speed and feed should be decreased
  - both the cutting speed and feed should be increased
  - there is no such criterion
257. The arbor of the milling machine is used to hold
- cutting tool \*
  - spindle
  - over arm
  - mandrel
  - workpiece
258. Very thin chips with end mills
- dull the cutting edge mills \*
  - improve tool life
  - sharpen the cutting edge
  - cause chipping of the cutting edge
  - cause tool breakage
259. Plain milling cutters should be
- smaller than the width of the flat surface to be measured
  - wider than the flat surface to be machined \*
  - equal to width of flat surface to be machined
  - there is no such criterion
  - none of the above
260. Plain milling cutters, if used to mill steps of grooves, would cause
- very good surface finish
  - extreme rubbing \*
  - dulling of the surface
  - excessive power consumption
  - correcting of centring
261. Stagger tooth milling cutters in comparison to straight tooth side mills
- permit smoother cutting action
  - have alternate helical teeth
  - have more chip clearance
  - permit deeper cuts
  - all of the above \*
262. A universal dividing head is used to perform a milling operation by
- plain indexing
  - direct indexing
  - differential indexing \*
  - compound indexing
  - complex indexing
263. Standard taper generally used on milling machine spindles is
- Morse
  - Brown and Sharpe \*
  - Chapman
  - Seller's
  - Metric
264. For sharpening milling cutters, the width of the land can be reduced by grinding
- primary clearance angle
  - secondary clearance angle
  - rake angle \*
  - suitable nose radius
  - back face
265. Dovetail milling cutter falls under the category of
- a plain milling cutter
  - a side milling cutter
  - an end milling cutter \*
  - a shaping tool
  - fly cutter
266. A perfect square on the end of a round shaft can be milled by mounting it on
- a differential
  - a compound rest
  - an index plate
  - a dividing head \*
  - universal table
267. In helical milling, the ratio of the circumference of the gear blank to the lead of the helix gives the
- angle setting of the machine table \*
  - proper speed to use
  - proper feed and depth of cut required
  - no. of teeth to be cut
  - gear ratio for table screw and dividing head
268. The accurate spacing of teeth in a gear blank requires the use of
- a dividing head \*
  - an index plate
  - a gear tooth vernier
  - a differential table
  - universal table



269. Helical gears can be cut on following type of milling machine
- vertical
  - horizontal
  - universal \*
  - drum-type
  - multi spindle
270. Feed rate in milling operation is expressed as
- mm/tooth \*
  - mm/r.p.m. of the milling cutter
  - meters/minute
  - revolution per minute
  - mm
271. Milling cutters are mounted on a part called the
- bracket or brace
  - arbor \*
  - shaft
  - dividing head
  - tang
272. The angle between the face of the blade and a line passing through the nose parallel to the milling cutter axis is called
- axial rake \*
  - radial rake
  - relief angle
  - clearance angle
  - lip angle
273. Negative rake is usually provided on
- H.S.S. tools
  - high carbon steel tools
  - cemented carbide tools \*
  - all of the above
  - none of the above
274. Side relief angle of a single point tool is the angle
- by which the face of the tool is inclined sideways
  - by which the face of the tool is inclined towards back
  - between the surface of the flank immediately below the point and a line drawn from the point perpendicular to the base
  - between the surface of the flank immediately below the point and a plane at right angles to the centre line of the point of the tool \*
  - none of the above
275. A left hand tool on lathe is used for turning in the direction
- from right to left
  - from left to right \*
  - across the bed
  - in angular position on compound slide
  - any direction
276. Counterboring is the operation of
- enlarging the end of a hole cylindrically \*
  - cone-shaped enlargement of the end of a hole
  - smoothing and squaring the surface around a hole
  - sizing and finishing a hole
  - none of the above
277. Power requirement, with increase in cutting speed
- more or less remains constant
  - increase linearly \*
  - decreases linearly
  - unpredictable
  - none of the above
278. It is required to divide a surface into six equal parts using Brown and Sharpe dividing head. Index handle should be rotated by
- 6 turns
  - $6\frac{2}{3}$  turns \*
  - $1\frac{1}{6}$  turns
  - $6\frac{1}{3}$  turns
  - none of the above
279. Heavy speed shafts to be turned by carbide tools on centre lathe must be supported in
- 3-jaw chuck
  - 4-jaw chuck \*
  - live centre
  - steady rest
  - collet
280. It is required to index 119 divisions. It can be done by
- simple indexing
  - direct indexing
  - compound indexing
  - differential indexing \*
  - any one of the above
281. One of the important parameters of lathe specification is
- swing over tool bed \*
  - swing over tool post
  - distance between centres
  - horse power
  - bed length
282. A quill is a
- tool holding device
  - work clamping device
  - tool used for milling operation
  - device used in heat treatment operation
  - steel tube in the head of some machine tools that enclose the bearings of rotating spindles on which are mounted the cutting tools \*
283. The different speeds on a lathe are provided in
- arithmetical progression
  - harmonical progression
  - geometrical progression \*
  - any one of the above
  - none of the above
284. Centring can be done most accurately on
- four jaw chuck \*
  - three jaw chuck
  - collet chuck
  - magnetic chuck
  - all of the above

285. Small sized cylindrical jobs on engine lathe are held in
- three jaw chuck
  - four jaw chuck
  - lathe dog
  - mandrel
  - collet \*
286. In gang milling
- several jobs can be performed in one set up
  - one job is completed on several milling machines located together
  - two or more cutters are mounted on the arbor and all of them remove the metal simultaneously \*
  - all of the above
  - none of the above
287. Spot facing is the operation of
- enlarging the end of a hole cylindrically
  - cone-shaped enlargement of the end of a hole
  - smoothing and squaring the surface around a hole \*
  - sizing and finishing a hole
  - none of the above
288. Trepanning operation is performed for
- finishing a drilled hole
  - truing a hole for alignment
  - producing large hole \*
  - sizing a small hole
  - none of the above
289. A T-slot is milled in a
- single operation
  - two operations \*
  - three operations
  - four operations
  - none of the above
290. End mills designed for cutting aluminium have
- fast helix angle
  - highly polished flutes
  - highly polished cutting edges
  - all of the above \*
  - none of the above
291. The part of the back of tooth adjacent to the cutting edge which is relieved to avoid interference between the surface being machined and the cutter is called
- land \*
  - fillet
  - face
  - cutting edge
  - relief angle
292. The centre of an existing hole is located
- by hit and trial
  - by callipers
  - using dividing head
  - with a dial indicator mounted in the machine spindle\*
  - not possible
293. When locating a number of positions on a workpiece, the backlash in the machine screws can be eliminated by
- backlash device
  - using new screw
  - positioning the work piece always from the same direction \*
  - first taking it forward and then backward
  - not possible
294. Drill press size is determined by
- the largest drill that will fit the machine
  - the larger piece of work that will fit the machine
  - the largest diameter work that can be drilled on centre
  - size of table
  - none of the above \*
295. When a workpiece requires several operations such as drilling, counter-boring, reaming etc., the following machine should be used
- radial drilling machine
  - multispindle drilling machine
  - hand drilling machine
  - gang-drilling machine \*
  - none of the above
296. Counter-sinking is the operation of
- enlarging the end of a hole cylindrically
  - cone-shaped enlargement of the end of a hole \*
  - smoothing and squaring the surface around a hole
  - sizing and finishing a hole
  - none of the above
297. For fast metal removal rate on lathe, it is recommended to
- increase speed
  - use hot machining
  - use carbide tool
  - use abundant supply of coolant
  - use roughing cut \*
298. Segmented chips are formed when machining
- ductile metal
  - brittle material \*
  - heat treated material
  - with lot of pressure and heat against the tool
  - none of the above
299. Machinability
- tends to increase with increase in hardness
  - tends to decrease with increase in hardness
  - remains unaffected with hardness
  - b is correct in general, but it can be drastically influenced by strain hardening and microstructure\*
  - none of the above
300. machinability depend on
- microstructure, physical and mechanical properties and composition of workpiece material \*
  - cutting forces
  - type of chip
  - tool life
  - profile of workpiece

301. Machinability tends to decrease with
- increase in hardness and increase in tensile strength
  - increase in strain hardening tendencies \*
  - increase in carbon content, hard oxide and carbide
  - decrease in grain-size
  - all of the above
302. Machinability can be calculated and predicted by following factor
- tensile strength
  - brinell hardness
  - shear angle
  - all of the above \*
  - none of the above
303. Ideal chip is
- heavy continuous chip
  - lighter continuous chip
  - tightly curled continuous chip
  - short, broken chip \*
  - none of the above
304. Shear angle varies with
- different materials and with tool geometry \*
  - cutting speed
  - feed
  - machine used
  - none of the above
305. continuous chips are formed when machining
- ductile metal \*
  - brittle material
  - heat treated
  - with lot of pressure and heat against the tool
  - none of the above
306. A  $5^\circ$  taper over 5 mm length is to be made on a 100 mm diameter job. Which method should be used ?
- taper turning attachment
  - tailstock offset method
  - compound rest method
  - form tool method \*
  - any one of the above
307. Chip breakers are provided on cutting tools
- for safety of operator
  - to minimise heat generation
  - to permit easy access of coolant at tool point
  - to permit short segmented chips \*
  - to increase tool life
308. Tool life is said to be over when
- finish of work becomes too rough
  - chips become blue
  - chattering starts
  - cutter looks dull
  - a certain amount of wear or cratering occurs on the flank \*
309. In the Taylor equation  $VT^n = C$ , value of index  $n$  is closely related to
- workpiece material
  - cutting tool material \*
  - working conditions
  - temperature at chip tool interface
  - none of the above
310. The relationship between the shear angle  $\phi$ , friction angle  $\beta$  and cutting rake angle  $\alpha$ , and the machining constant  $C$  for the work material is
- $2\phi + \beta - \alpha = C$  \*
  - $2\alpha + \beta - \phi = C$
  - $2\beta + \alpha - \phi = C$
  - $2\phi + \alpha - \beta = C$
  - $2\phi + \alpha + \beta = C$
311. Wear limit on cutting tool is of the order of
- 0.2mm
  - 0.8 mm \*
  - 1.6mm
  - 2.5mm
  - none of the above
312. With high speed steel tools, the maximum safe operating temperature is of the order of
- $200^\circ\text{C}$
  - $540^\circ\text{C}$  \*
  - $760^\circ\text{C}$
  - $870^\circ\text{C}$
  - $1100^\circ\text{C}$
313. To remove maximum material per minute with the same tool life
- increase depth of cut \*
  - increase feed rate
  - decrease cutting speed
  - increase cutting speed
  - all of the above
314. The included angle between the land and the face of the tooth is called
- rake angle
  - lip angle \*
  - relief angle
  - primary clearance angle
  - axial rake
315. A cutting tool having tool signature as 10, 10, 6, 6, 8, 8, 2 will have back angle as
- $10^\circ$  \*
  - $6^\circ$
  - $8^\circ$
  - $2^\circ$
  - none of the above
316. The last element in the tool signature is
- back rake angle
  - side rake angle
  - nose radius \*
  - end cutting edge angle
  - side-relief angle
317. As cutting speed increases, the built up edge
- becomes smaller and finally does not form at all \*
  - becomes bigger
  - has nothing to do with speed
  - may or may not form depending on other conditions
  - none of the above

318. Carbide tools wear out faster at  
 a. slow speeds  
 b. medium speeds \*  
 c. fast speeds  
 d. very fast speeds  
 e. speed is no criterion for wear
319. Which of the following tools are harder and more wear resistant than tungsten carbide but are weaker in tension  
 a. low carbon steel tools  
 b. high carbon steel tools  
 c. H.S.S. tools  
 d. ceramic tools \*  
 e. none of the above
320. Ceramic tips are prepared from  
 a. tungsten powder  
 b. carbon powder  
 c. aluminium oxide powder \*  
 d. silicon carbide powder  
 e. H.S.S. powder
321. Which of the following are cast alloys containing tungsten and chromium carbides in a matrix of cobalt and chromium  
 a. mechanites                      b. tungsten carbides  
 c. bakelites                        d. stellites \*  
 e. ceramics
322. Carbide tips are fixed to the shanks of cutting tools by  
 a. forging                            b. sintering  
 c. welding                            d. soldering  
 e. brazing \*
323. The most wear-resistant grade of carbide used for cutting tools is the straight  
 a. iron carbide                      b. calcium carbide  
 c. tungsten carbide \*              d. nickle carbide  
 e. aluminium carbide
324. With increase in cutting speed, the finish  
 a. improves considerably  
 b. improves slightly \*  
 c. remains same  
 d. gets poor  
 e. gets poor or improves depending on work material
325. When turning a long shaft on a lathe, its bending can be prevented by  
 a. running the shaft at low speed  
 b. using low feed  
 c. using low depth of cut  
 d. using sturdy machine  
 e. using steady rest \*
326. In oblique cutting system, the chip thickness is  
 a. maximum at middle \*    b. maximum at sides  
 c. minimum at middle      d. uniform throughout  
 e. none of the above
327. Finish is more affected by  
 a. cutting speed                    b. depth of cut  
 c. feed-rate \*                      d. lubricant  
 e. none of the above
328. Best method of increasing the rate of removing metal is  
 a. incese speed  
 b. increase feed-rate  
 c. increase depth of cut \*  
 d. increase nose radius  
 e. supply more quantity of lubricant
329. Cemented carbide tools wear faster at  
 a. high speed                        b. very high speed  
 c. medium speed                    d. very low speed \*  
 e. none of the above
330. The machining operation of cutting a keyway inside a drilled hole is known as  
 a. reaming                            b. broaching \*  
 c. boring                              d. tapping  
 e. counter sinking
331. The process of trimming is associated with  
 a. forging                            b. electroplating  
 c. machining                        d. polishing  
 e. press work \*
332. The numerical control system which is applicable to a milling machine is called the  
 a. point to point system  
 b. continuous path system \*  
 c. zig-zag machining system  
 d. straight cut-system  
 e. contouring system
333. The broaching operation in which the work moves past the stationary tool is called  
 a. pull broaching  
 b. push broaching  
 c. surface broaching \*  
 d. continuous broaching  
 e. full broaching
334. The point to point system of numerical control can be applied only to the conventional  
 a. drilling machine or jig boring operations \*  
 b. milling operations  
 c. shaper operations  
 d. lathes  
 e. grinder
335. The following machine should be specified when complex parts in short run quantities with variation have to be produced  
 a. copying  
 b. NC machine \*  
 c. transfer machine  
 d. electro-chemical milling machine  
 e. non-conventional machines

336. Relief or clearance angles on H.S.S. tools usually vary from  
 a. 0 to 30°                      b. 3 to 10° \*  
 c. 10 to 15°                     d. 15 to 20°  
 e. 20 to 30°
337. The purpose of providing relief or clearance angles on tools is to  
 a. permit chip formation  
 b. facilitate easy flow of chips  
 c. strain harden the material  
 d. strengthen the tool  
 e. prevent tool from rubbing on the work \*
338. High speed tools compared to carbon steel tools operate at  
 a. same speed  
 b. 2-3 times higher speed \*  
 c. 2-3 times lower speed  
 d. 3-5 times higher speed  
 e. 5-8 times higher speed
339. The cutting speed of H.S.S. milling cutter to machine aluminium is  
 a. 25-40 m/mt  
 b. 50-80 m/mt  
 c. 100-160 m/mt  
 d. 180-240 m/mt \*  
 e. 240-400 m/mt
340. In starddle milling, following number of side milling cutters are mounted on the arbor  
 a. 1                                 b. 2 \*  
 c. 3                                 d. 4  
 e. none of the above
341. The following cutting fluid is used when milling with carbide tipped milling cutter  
 a. kerosene                      b. lard oil  
 c. water                          d. CO<sub>2</sub>  
 e. dry \*
342. which of the following is not a multipoint cutting tool  
 a. drill                              b. reamer  
 c. milling                          d. parting tool \*  
 e. grinding wheel
343. The included angle of taper in collet is usually  
 a. 1-2°                              b. 5-10°  
 c. 30° \*                             d. 45°  
 e. 60°
344. Which of the following machines utilise fly cutter ?  
 a. lathe                             b. planer  
 c. shaper                          d. broaching  
 e. milling machine \*
345. The positive radial rake angle in most of the high speed milling cutters is  
 a. -5 to 0°                         b. 0-5°  
 c. 5-10°                            d. 10-15° \*  
 e. 15-25°
346. Pick up the correct statement for milling  
 a. cutter is rotated in the opposite direction of travel of job \*  
 b. thickness of chip is maximum at the beginning of cut  
 c. cutting force is directed downwards  
 d. coolant can be easily poured on the cutting edge  
 e. all of the above
347. A right hand tool is one which is used to  
 a. start a cut from tailstock and cut toward the headstock  
 b. start a cut from head stock and cut toward the tailstock  
 c. start facing at the centre and cut outward  
 d. both 'a' and 'c' are correct \*  
 e. both 'b' and 'c' are correct
348. For turning mild steel, type of tool used is  
 a. left hand type \*  
 b. right hand type  
 c. any one of the two  
 d. depends on cutting angles and tool material  
 e. none of the above
349. Negative rakes are used for  
 a. heavy loads  
 b. harder materials  
 c. carbide tools  
 d. all of the above \*  
 e. none of the above
350. The helix angle of the teeth of a heavy duty plain milling cutter is of the order of  
 a. -15° to 0°                      b. 0° to 5°  
 c. 10° to 20°                      d. 25° to 45° \*  
 e. 45° to 60°
351. Purpose of side rake is to  
 a. avoid work from rubbing against tool  
 b. control chip flow \*  
 c. strengthen tool edge  
 d. break chips  
 e. shear off the metal
352. Relief angles on carbide tips are usually provided between  
 a. 3-5° \*                             b. 5-8°  
 c. 3-12°                             d. 12-15°  
 e. 15-20°
353. A grinding wheel gets glazed (shining cutting edges) due to  
 a. wear of abrasive grains \*  
 b. breaking up of abrasive grains  
 c. wear of bond  
 d. cracks of grinding wheel  
 e. embedding of fine chips and metal powder on wheel

354. In grinding operation, for grinding softer materials
- coarser grain size is used \*
  - fine grain size is used
  - medium grain size is used
  - any grain size may be used
  - none of the above
355. Maximum cutting angles are used for machining
- mild steel
  - cast iron
  - free machining steels
  - nickle alloy
  - aluminium alloys \*
356. A work on the milling machine can be indexing by
- universal milling attachment
  - chasing dial
  - dividing head attachment \*
  - manipulating vertical and horizontal movements
  - rotary tables
357. In tool signature, nose radius is indicated
- in the beginning
  - at the end \*
  - in the middle
  - not indicated
  - none of the above
358. Reaming is the operation of
- enlarging the end of a hole cylindrically
  - cone shaped enlargement of the end of a hole
  - smoothing and squaring the surface around a hole
  - sizing and finishing a hole \*
  - none of the above
359. Which of the following is fastest method of cutting gears
- milling
  - gear shaping
  - gear hobbing \*
  - gear burnishing
  - all of the above
360. Hard ferrous metals like steel and cast iron are cut with following medium size grit cut off wheels
- $Al_2O_3$  \*
  - SiC
  - diamond grit
  - garnet
  - boron carbide
361. In grinding operation, for grinding harder material
- coarser grain size is used
  - fine grain size is used \*
  - medium grain size is used
  - any grain size may be used
  - none of the above
362. Which of the following abrasives will be selected for grinding tool steel and high speed steel
- diamond
  - $Al_2O_3$  \*
  - SiC
  - boron carbide
  - none of the above
363. Which abrasive particle would you choose for grinding bronze valve bodies
- silicon carbide \*
  - aluminium oxide
  - diamond
  - cubic boron nitride
  - none of the above
364. Which abrasive particle would you choose for grinding high speed steel tools
- silicon carbide
  - diamond
  - diamond
  - cubic boron nitride \*
  - none of the above
365. For grinding operation in which heat generation must be kept minimum, the following bond of wheel must be used
- resinoid rubber
  - silicate \*
  - vitrified
  - shellac
  - any one of the above
366. Holes in parts which have been hardened by heat treatment can be finished to accurate size only by
- drilling
  - boring
  - internal grinding \*
  - reaming
  - any one of the above
367. Which of the following is an example of snag grinding
- removing excess metal on weld
  - grinding a parting line left on casting
  - trimming the surface left by sprues and risers
  - removing flash from forgings
  - all of the above \*
368. The grit size of the abrasives used in the grinding wheel is usually specified by the
- hardness number
  - size of the wheel
  - softness or hardness of the abrasive
  - mesh number \*
  - refractive index
369. A grinding wheel gets glazed due to
- wear of abrasive grains \*
  - wear of bond
  - breaking of abrasives
  - cracks in wheel
  - sharpening of wheel
370. In grinding practice, the term "hardness of the wheel" or "grade of the wheel" refers to
- hardness of the abrasives used
  - strength of the bond of the wheel \*
  - finish of the wheel
  - hardness of the workpiece
  - type of abrasive used
371. Which abrasive particle would you choose for grinding tungsten carbide tool inserts
- silicon carbide
  - aluminium oxide
  - diamond \*
  - cubic boron carbide
  - none of the above
372. Which of the following is the natural abrasive
- $Al_2O_3$
  - SiC
  - boron-carbide
  - corundum \*
  - boron

373. Which of the following is the manufactured abrasive
- corundum
  - quartz
  - emery
  - SiC \*
  - diamond
374. Which abrasive particle would you choose for grinding steel fittings
- silicon carbide
  - aluminium oxide \*
  - diamond
  - cubic boron nitride
  - any one of the above
375. Which bond is used in cut off wheels
- rubber \*
  - vitrified
  - resinoid
  - shellac
  - any one of the above
376. Which of the following abrasive will be used for grinding ceramics
- diamond
  - $Al_2O_3$  \*
  - SiC
  - boron carbide
  - none of the above
377. Pick up the incorrect statement about grinding
- for cutting soft material, hard wheel is used
  - for cutting hard material, hard wheel is used \*
  - for grinding soft material, dry condition is required
  - for grinding hard material, wet condition is required
  - slower wheel speeds cause the wheel to act as if it were harder
378. Grinding wheel is flooded with coolant in order to
- remove chips
  - remove heat \*
  - clean the wheel
  - clean the job
  - clean the machine
379. Hardness of grinding wheel is determined by
- the resistance exerted by the bond against grinding stress \*
  - hardness of abrasive grains
  - hardness of bond
  - its ability to penetration
  - its ability to work without scratches
380. The process of improving cutting action of grinding wheel is called
- dressing operation \*
  - turning operation
  - cutting operation
  - facing operation
  - clearing operation
381. In cylindrical grinding operations, the work compared to grinding wheel is always rotated
- at a much slower speed \*
  - at a much faster speed
  - at the same speed
  - at 100 rpm more
  - there is no such correlations
382. Pick up the wrong statement
- for grinding hard as well as brittle materials, fine grained grinding wheel is used
  - for grinding metal at fast rate, coarse grained wheel is used
  - for grinding hard materials, soft grade is used and vice versa
  - for grinding soft material, fine grain is used \*
  - for grinding soft and ductile materials, coarse grained wheel is used
383. A slight taper on the full length of a long shaft mounted between centres on a universal cylindrical grinder, can be ground by
- off setting the tail stock
  - swivelling the table on its base
  - swivelling the wheel head \*
  - swivelling the workpiece
  - taper turning attachment
384. What kind of abrasive cut-off wheel should be used to cut concrete, stone and masonry ?
- SiC
  - $Al_2O_3$
  - diamond grit \*
  - garnet
  - glass
385. Aluminium oxide wheel would be selected for grinding
- cast iron
  - cemented carbide
  - ceramic materials
  - HSS \*
  - all of the above
386. The grit, grade and structure of grinding wheels for specific operations are based on
- grinder clearance
  - spindle size of the grinder
  - diameter of wheel
  - speed at which the wheel is to be used \*
  - thickness of wheel
387. When it is required to run a grinding wheel safely at very high speed, following bond should be used
- vitrified
  - shellac
  - silicate
  - resinoid and rubber \*
  - any one of the above
388. In grinding operation, for grinding softer material
- softer grade is used
  - high grade is used \*
  - medium grade is used
  - any grade may be used
  - none of the above
389. Crack is developed in grinding wheel due to
- generation of heat
  - high speed \*
  - slower speed
  - hard work
  - none of the above

390. The face of the wet type grinder is crowned slightly to minimise the amount of contact between the wheel and the work. This reduces the possibility of the carbide tip
- being damaged or destroyed by excessive heat \*
  - being ground away too rapidly
  - damaging the wheel by causing it to wear rapidly
  - all of the above
  - none of the above
391. In grinding operation, for grinding harder material
- softer grade is used \*
  - high grade is used
  - medium grade is used
  - any grade may be used
  - none of the above
392. The following material is used for diamond lapping
- HSS
  - copper \*
  - aluminium oxide
  - high carbon steel
  - none of the above
393. A dense structure in grinding wheel is used for
- heavy cuts
  - ductile material
  - elastic material
  - hard material
  - finishing cuts \*
394. Pick up the incorrect statement about  $Al_2O_3$  grinding wheel
- it is less tough than SiC \*
  - it is suitable for high tensile strength material
  - it is used for grinding hardened steel, hard bronze, steel billets etc.
  - it is less hard than SiC
  - it is more shock resistant
395. Ball grinding compared to cylindrical and flat grinding requires
- harder wheel \*
  - softer wheel
  - medium wheel
  - harder/softer wheel depending on material
  - softest wheel
396. Hard materials require
- fine grit sizes and hard grades
  - coarse grit and hard grades
  - coarse grit sizes and soft grades
  - fine grit sizes and soft grades \*
  - none of the above
397. Soft ductile materials require
- fine grit sizes and hard grades
  - coarse grit sizes and hard grades \*
  - coarse grit sizes and soft grades
  - fine grit sizes and soft grades
  - none of the above
398. When the grains of a grinding wheel become dulled, then it needs to be
- replaced
  - trued
  - dressed \*
  - treated
  - reground
399. The hardness of a grinding wheel is specified by
- BHN
  - Rockwell hardness number
  - LPN
  - search test
  - letter of alphabet \*
400. Honing operation produces normal quality of finish of the order of
- 0.01 to 0.08  $\mu\text{m}$  CLA value
  - 0.08 to 0.2  $\mu\text{m}$  CLA value
  - 0.2 to 0.4  $\mu\text{m}$  CLA value \*
  - 0.4 to 0.8  $\mu\text{m}$  CLA value
  - 0.8 to 1.5  $\mu\text{m}$  CLA value
401. A 5 mm thick shoulder on a 100 mm diameter shaft will be ground by the following operation
- cylindrical grinding
  - centreless grinding
  - plunge grinding \*
  - surface grinding
  - diamond dressing
402. When the area of contact between wheel and work is small, then following grade should be used for grinding wheel
- harder
  - hardest
  - medium
  - softer \*
  - softest
403. The standard marking system for grinding wheels has following number of symbols
- 1
  - 2
  - 3
  - 4
  - 5 \*
404. A grinding wheel is balanced as follows so that it will not vibrate
- putting balancing weights on the wheel
  - enlarging the spindle hole
  - using wheel dampers
  - dressing the wheel with dressing tool \*
  - none of the wheel
405. The operation of sharpening a grinding wheel is called
- trueing
  - dressing \*
  - aligning
  - balancing
  - bonding
406. The most popular chuck used on surfacegrinders is
- pneumatic chuck
  - hydraulic chuck
  - three-jaw chuck
  - magnetic chuck \*
  - independent chuck



407. An open structure of a grinding wheel is used for  
 a. tough materials      b. ductile materials  
 c. heavy cuts            d. soft materials  
 e. all of the above \*
408. Dressing of grinding wheels to restore sharpness is done by  
 a. pumice stone dresser  
 b. tool steel dresser  
 c. diamond dresser \*  
 d. sharp edged H.S.S. cutter  
 e. solid carbon steel bar
409. In a hard grade grinding wheel, the abrasives  
 a. are hard  
 b. have dense structure  
 c. get lodged off easily  
 d. are of fine grain  
 e. are held more securely \*
410. When grinding wheels become loaded or glazed, they must be  
 a. balanced properly      b. aligned accurately  
 c. trued                      d. dressed \*  
 e. discarded
411. For grinding high tensile strength materials, following abrasive is recommended  
 a.  $Al_2O_3$  \*                      b. SiC  
 c. diamond                      d. corundum  
 e. boron carbide
412. A centre type cylindrical grinder that permits swivelling the wheel head and head stock at an angle to the table ways is called a  
 a. tool and cutter grinder  
 b. surface grinder  
 c. internal grinding machine  
 d. bench grinder  
 e. universal grinder \*
413. The first symbol in a grinding wheel code is the  
 a. bond type                      b. abrasive type \*  
 c. grain size                      d. structure  
 e. bond grade
414. In grinding operation, for faster removal of material  
 a. fine grain size is used  
 b. medium grain size is used  
 c. coarse grain size is used \*  
 d. any grain size may be used  
 e. none of the above
415. A grinding wheel is completely specified by the following elements taken in order  
 a. type of abrasive, grain size, grade, structure, bond\*  
 b. grain size, grade, structure, type of abrasive, bond  
 c. structure, bond, grain size, type of abrasive, grade  
 d. bond, structure, grain size, type of abrasive, bond  
 e. none of the above
416. Which of the following parts of a universal grinding machine can be swivelled with respect to table travel  
 a. grinding wheel              b. table  
 c. headstock                      d. table slide \*  
 e. all of the above
417. Tolerances are specified  
 a. to obtain desired fits  
 b. because it is not possible to manufacture a size exactly \*  
 c. to obtain higher accuracy  
 d. to have proper allowances  
 e. to have proper inspection
418. Drilling is an example of  
 a. simple cutting              b. uniform cutting  
 c. orthogonal cutting          d. oblique cutting \*  
 e. complex cutting
419. In a cutting operation, the force is  
 a. axial or longitudinal force  
 b. tangential force \*  
 c. radial force  
 d. along shear plan  
 e. both 'a' and 'b' are correct
420. When radial force in cutting operation is too large, it will cause  
 a. best finish  
 b. chatter and poor finish \*  
 c. finish has nothing to do with radial force  
 d. shorten tool life  
 e. all of the above
421. The cutting force is affected by  
 a. feed, speed and depth of cut  
 b. cutting tool angle  
 c. material hardness  
 d. type of lubricant  
 e. both 'a' and 'c' are correct \*
422. Titanium carbide coated tools  
 a. require frequent regrindings  
 b. require a few regrindings  
 c. require regrinding according to equipment \*  
 d. require no regrinding  
 e. none of the above
423. Tolerances on commonly used twist drill diameters are held quite close, averaging  
 a. +0.02 mm, -0.02 mm      b. +0, -0.02 mm \*  
 c. 0.0 mm, -0 mm              d. +0.002 m, -0.02 mm  
 e. +0, -0.2 mm
424. Drill diameter is measured over the  
 a. main body  
 b. plain shank portion  
 c. margins at the drill point \*  
 d. heel  
 e. lips

425. Point angle of  $90^\circ$  on drills is used for  
 a. all general applications on mild steel  
 b. bakelite, hard rubber and fibrous plastics \*  
 c. hard steels and nickle alloys  
 d. thin steel metal  
 e. there is no such criterion
426. An oversize hole will be produced in drilling, if  
 a. feed rate is very high  
 b. cutting speed is very high  
 c. lips of drill are of unequal length  
 d. unsuffiecient coolant is used \*  
 e. drill is not properly fixed
427. The most widely used material for drills, taps and reamers is  
 a. low alloys carbon steel \*  
 b. high speed steel  
 c. carbon steel  
 d. cemented carbide  
 e. ceramic
428. Choose the correct statement  
 A twist drill produces a hole of  
 a. fine finish  
 b. accurate size  
 c. exactly round  
 d. exactly positioned  
 e. none of the above \*
429. The most suitable machine for drilling holes in rifle barrels is  
 a. ultrasonic machining  
 b. laser machining  
 c. radial drilling machine  
 d. deep hole drilling machine \*  
 e. plasma arc drilling
430. Time taken to drill a hole through a 25 mm thick plate at 300 r.p.m. at a feed rate of 0.25 mm/revolution will be  
 a. 10 sec  
 b. 20 sec \*  
 c. 25 sec  
 d. 40 sec  
 e. 50 sec
431. A twist drill is specified by  
 a. am alphabet specifying hole size  
 b. a number specifying hole size  
 c. the size of hole it can drill  
 d. any one of the above \*  
 e. none of the above
432. The metal is removed in drilling operation by  
 a. work hardening of metal  
 b. compression  
 c. shearing  
 d. extrusion  
 e. shearing and extrusion \*
433. The optimum lip angle of the twist drill for the work material of mild steel should be  
 a.  $108^\circ$   
 b.  $110^\circ$   
 c.  $118^\circ$  \*  
 d.  $120^\circ$   
 e.  $181^\circ$
434. A twist drill is specified by its shank, material and  
 a. lip angle  
 b. diameter \*  
 c. length of body  
 d. size of flute  
 e. all of the above
435. The best way to check the sharpness of a drill of tungsten carbide-tipped bit is to  
 a. inspect it physically  
 b. test hardness  
 c. drill a test hole \*  
 d. judge its finish  
 e. rub it against a known surface
436. Quill in connection with drilling machine refers to  
 a. drill holding mechanism  
 b. rack  
 c. key way \*  
 d. pinion  
 e. none of the above
437. The helix angle on a HSS twist drill for drilling cast iron is of the order of  
 a.  $14-22^\circ$   
 b.  $24-32^\circ$  \*  
 c.  $35-40^\circ$   
 d.  $40-45^\circ$   
 e.  $45-55^\circ$
438. Twist fluted drills are preferred because  
 a. it cuts holes efficiently  
 b. it is a light weight tool  
 c. cutting lip is supported rigidly  
 d. it moves swiftly in the metal  
 e. chips move out automatically \*
439. A portable drilling machine is specified by  
 a. the size of the job it can hold  
 b. maximum diameter of drill it can hold \*  
 c. spindle speeds and feeds  
 d. maximum spindle travel  
 e. size of the table
440. The rake angle of a single point cutting tool corresponds to following angle of a twist drill  
 a. point angle  
 b. helix angle \*  
 c. lip diameter angle  
 d. chisel edge angle  
 e. primary angle
441. A cutting tool used to make a recess at the top of a drilled hole for a flat head machine screw is known as  
 a. a core drill  
 b. a spade drill  
 c. a reamer  
 d. an end mill  
 e. a countersink tool \*

442. Which of the following drilling machine is not equipped with power feeds
- sensitive drill press \*
  - multiple-spindle drilling machine
  - radial drilling machine
  - gang drilling machine
  - none of the above
443. When a number of single spindle drilling machine columns are placed side by side on a common work table, the machine is known as
- radial drilling machine
  - gang drilling machine \*
  - multiple-spindle drilling machine
  - universal drilling machine
  - pillar type drilling machine
444. The purpose of reaming is
- for making a hole initially
  - to enlarge the diameter of the hole
  - to improve the finish of the hole \*
  - to achieve correct diameter
  - to correct location of hole
445. For reaming holes with solid reamers, reamer is mounted in
- a rigid holder
  - a floating holder \*
  - a semi-rigid holder
  - a collet
  - universal holder
446. Reamer is always held in
- floating chuck
  - mandrel \*
  - coller chuck
  - self and centering chuck
  - universal chuck
447. In which type of milling operation, the chip is cut off at thinnest place and the chip thickness increases along chip length
- up milling \*
  - down milling
  - end milling
  - climb milling
  - keyway milling
448. In which type of milling maximum friction is caused
- up milling \*
  - down milling
  - end milling
  - climb milling
  - keyway milling
449. In which milling operation, the cutting force tends to lift the workpiece
- conventional \*
  - down
  - climb
  - end
  - form milling
450. Any number of equal divisions can be obtained on milling machine by
- plain indexing
  - simple indexing
  - compound indexing
  - differential indexing \*
  - any one of the above
451. Listed below are some of the advantages of conventional (up) milling and some of the climb (down) milling
- Older machines having backlash in their leadscrew can be used
  - Downward force helps keep work flat and thus very helpful for machining thin parts
  - Chips are thrown away from the direction of the cutter's travel
  - On sand castings, cutter is not damaged
  - Better finish obtained on steel, but not on aluminium
  - Normal pressure on material is less, thereby advantageous for work hardening materials
- The advantages of conventional milling are
- (i), (ii) and (iii)
  - (i), (ii) and (vi)
  - (i), (iv) and (v) \*
  - (ii), (v) and (vi)
  - (iii), (iv) and (v)
452. The advantages of climb milling are
- (ii), (iii) and (v)
  - (ii), (iv) and (vi)
  - (iii), (v) and (vi)
  - (i), (iv) and (v)
  - (ii), (iii) and (vi) \*
453. Listed below are some of the disadvantages of conventional and some of the climb milling
- Chips get picked up and carried around the cutter, thereby spoiling the finish
  - Cutter force tends to lift the work off the table
  - On steel, finish may be slightly rougher
  - Machine must have zero backlash or there will be chatter as the cutter tries to pull the table faster than the feed rate
- The advantages of climb milling are
- (i) and (ii)
  - (i) and (iii)
  - (ii) and (iii)
  - (iii) and (iv) \*
  - (i) and (iv)
454. The disadvantages of conventional milling are
- (i) and (ii) \*
  - (i) and (iii)
  - (ii) and (iii)
  - (iii) and (iv)
  - (i) and (iv)
455. In finish grinding, the grinding ratio varies from
- 1.0 to 5.0
  - 5.0 to 10.0
  - 10.0 to 25.0
  - 25.0 to 50.0 \*
  - 50.0 to 100.0
456. Grinding operation is used for
- removing material
  - shaping
  - dressing
  - forming
  - finishing \*

457. Grinding wheel is balanced
- at the time of manufacture
  - before grinding
  - after grinding operation
  - frequently \*
  - none of the above
458. Which of the following processes would remove least material
- grinding
  - lapping
  - honing
  - super-finishing \*
  - buffing
459. Which of the following operations would be performed at maximum peripheral speed
- surface grinding
  - internal grinding
  - cylindrical grinding
  - grinding with rubber, shellac and resinoid bonded wheel \*
  - snagging off hand grinding with vitrified wheel
460. The process of precision grinding of part with loose dust type abrasive is known as
- honing
  - buffing
  - superfinishing
  - lapping \*
  - polishing
461. Majority of the grinding wheels use the following type of bond
- resinoid
  - silicate
  - shellac
  - vitrified \*
  - rubber
462. Workpiece is supported as follows in centreless grinding
- on magnetic chucks
  - in centre
  - in collet chuck
  - in universal chuck
  - none of the above \*
463. Buffing is the operation of
- cleaning castings
  - depositing metal by spraying
  - broaching in reverse direction
  - producing lustre on metal surface \*
  - preventing damage of metal by corrosion
464. The workpiece is advanced as follows in centreless grinding
- manually by operator
  - automatically by machine drive
  - on its own
  - force exerted by regulating wheel \*
  - force exerted by grinding wheel
465. Grinding wheel is balanced frequently because of
- high rpm
  - random wear \*
  - uneven wear
  - frequent glazing
  - high stresses
466. For grinding steel and alloy steel, following material of wheel should be chosen
- aluminium oxide \*
  - silicon carbide
  - borazon
  - diamond
  - none of the above
467. Pick up incorrect statement about centreless grinding
- it is suitable for ling jobs
  - rate of production as compared to cylindrical grinding is low \*
  - wear and tear of machine is less
  - cost of production as compared to cylindrical grinding is less
  - regulating wheel is usually rubber bonded
468. The regulating wheel in centreless grinding is usually
- smaller than grinding wheel \*
  - bigger than grinding wheel
  - of some size as grinding wheel
  - smaller than workpiece
  - could be of any size
469. In centreless grinding machine, the maximum angular adjustment of following order is provided
- 5°
  - 10° \*
  - 20°
  - 30°
  - 40°
470. Surface speed of the grinding wheel in centreless grinding is
- 15 to 60 m/mt
  - 100 to 500 m.mt
  - 500 to 1000 m/mt
  - 1000 to 1500 m/mt
  - 1500 to 1800 m/mt \*
471. The surface speed of regulating wheel in centreless grinding varies from
- 10-15 m/mt
  - 15-16 m/mt \*
  - 60-120 m/mt
  - 120-140 m/mt
  - 240-500 m/mt
472. Following grinding speed (surface meters per minute) is used for grinding plain carbon steels
- 250-500
  - 500-900
  - 1000-1500
  - 1500-2000 \*
  - 2000-3000
473. For very fine finishing and polishing of metals such as ball bearing races, following type of bond is used
- vitrified
  - resinoid
  - shellac \*
  - silicate
  - rubber
474. Following operation needs to be performed to obtain surface finish of the order of 0.75 to 1.25  $\mu\text{m}$
- grinding \*
  - honing
  - buffing
  - lapping
  - burnishing

475. In centreless grinding operation, the regulating wheel rotates at
- 1 to 15 m/mt
  - 25 to 60 m/mt \*
  - 60 to 100 m/mt
  - 100 to 180 m/mt
  - 180 to 250 m/mt
476. The sizes (diameter) of grinding wheel and regulating wheel in centreless grinding operation are
- 100 mm, 50 mm
  - 200 mm, 100 mm
  - 300 mm, 150 mm
  - 500 mm, 300 mm \*
  - 800 mm, 500 mm
477. The finish of a ground surface could be poor due to
- low rpm
  - vibrations in machine
  - unbalanced wheel
  - using soft wheel
  - dulling of the abrasive grains \*
478. In centreless grinding operation, the regulating wheel is inclined at
- 0-8° \*
  - 9-12°
  - 12-15°
  - 15-20°
  - 20-25°
479. The hardness or softness of a grinding wheel is determined by
- hardness of abrasive
  - hardness of bond
  - wheel structure
  - amount and kind of bonding material used \*
  - abrasive grain size
480. Lapping, honing etc. are following type of machining processes
- high speed abrasive
  - low speed abrasive \*
  - medium speed abrasive
  - large material removal
  - none of the above
481. For lapping operation, it is customary to leave only following amount of stock to be removed
- 0.001 to 0.01 mm
  - 0.01 to 0.1 mm
  - 0.1 to 0.5 mm
  - 0.5 to 1.0 mm \*
  - none of the above
482. Honing operation
- can be used to change the location of hole or correct a sloped condition of a hole
  - can't be used for the application in (a) above \*
  - above application is possible under some circumstances
  - above application depends upon the size of hole
  - none of the above
483. For grinding cast iron, brass, aluminium, etc. use following material of wheel
- aluminium oxide
  - silicon carbide \*
  - borazon
  - diamond
  - none of the above
484. Accuracy of measuring equipment is
- the closeness with which a measurement can be read directly from a measuring instrument
  - a measure of how close the reading is to the true size \*
  - the difference between measured value and actual value
  - the smallest change in measurand that can be measured
  - the capability to indicate the same reading again and again for a given measurand
485. Pressure applied on workpiece in case of lapping operation is
- 0.01 kg/cm<sup>2</sup>
  - 0.1 kg/cm<sup>2</sup> \*
  - 0.5 kg/cm<sup>2</sup>
  - 1.0 kg/cm<sup>2</sup>
  - none of the above
486. Buffing process is used
- to achieve flatness
  - to achieve roundness
  - to improve surface finish
  - to obtain very smooth reflective surfaces \*
  - not used in workshops
487. The following is the process used for producing fine surface finish
- shot peening
  - sintering
  - broaching
  - tumbling \*
  - swaging
488. Tumbling process
- can be applied to any size, shape and material of workpiece \*
  - can be applied only to simple and uniform shaped workpieces
  - can be applied only to machine finished product
  - is not suitable for cast components
  - none of the above
489. Precision of measuring equipment is
- the closeness with which a measurement can be read directly from a measuring instrument \*
  - a measure of how close the reading is to the true size
  - the difference between measured value and actual value
  - the smallest change in measured that can be measured
  - the capability to indicate the same reading again and again for a given measurand

490. Which of the following can be used to scribe lines parallel to the edges of a part
- vernier callipers
  - screw gauge
  - divider
  - hermaphrodite caliper \*
  - combination set
491. Which of the following instruments is most accurate
- vertical caliper
  - manometric screw gauge
  - optical projector \*
  - mechanical comparator
  - slip gauges
492. A surface gauge is used for
- levelling the surface plate
  - checking the surface finish
  - laying out the work accurately \*
  - finding the depth of the surface
  - finding flatness of surfaces
493. A feeler gauge is used to check
- radius
  - screw pitch
  - surface roughness
  - un symmetrical shape
  - thickness of clearance \*
494. Work is usually required to be held in a vertical position for laying out. For this purpose, it is clamped to
- surface plate
  - an angle plate \*
  - a V-block
  - a machine bed
  - engineer's square
495. A hacksaw is specified by the following parameter of its blade
- material
  - length \*
  - width
  - number of teeth
  - distance between two holes at extreme
496. Thin metal pieces can be cut by
- using a blade with very fine teeth
  - placing several pieces together and cutting them at the same time
  - placing the metal between two pieces of wood and cutting through both metal and wood \*
  - all of the above
  - none of the above
497. The length of a hacksaw blade is measured
- over toothed length
  - from one extreme to other
  - in between centres of two holes at both the ends\*
  - as the length of cut
  - as certain multiples of the width of blade
498. To prevent the blade of the saw from binding in the saw, blade is
- reinforced
  - strengthened
  - twisted
  - set \*
  - tinned and sharpened
499. When the file is pushed and pulled across the work, it is called
- push-pull filing
  - straight filing
  - draw filing \*
  - all of the above
  - none of the above
500. The thickness of light gauge sheet steel can be checked with a
- finely divided steel scale
  - depth gauge
  - hermaphrodite caliper
  - micrometer \*
  - thickness measuring machine fitted with dial gauge
501. Optical flats are made of
- quartz \*
  - glass
  - plastic
  - steel
  - silicon
502. The least count of a metric vernier caliper having 25 divisions on vernier scale, matching with 24 divisions of main scale (1 m.s division = 0.5 mm) is
- 0.05 mm
  - 0.01 mm
  - 0.02 mm \*
  - 0.001 mm
  - 0.005 mm
503. The thread micrometer measures
- the major diameter of the thread
  - the minor diameter of the thread
  - the effective diameter of the thread \*
  - the root diameter of the thread
  - all the diameters of the thread
504. An important precaution to be observed during filing operation is to
- not rub finger over file
  - not rub finger over the work \*
  - apply equal pressure on file
  - properly support file
  - clean file frequently
505. If a hole is to be tapped its size should be
- equal to diameter of the desired thread
  - a few microns larger than the desired threads
  - a few microns smaller than the desired threads
  - any one of the above
  - none of the above \*
506. V-block is used in the workshop to check
- roundness of a cylindrical work \*
  - surface roughness
  - dimensions of oval job
  - taper on a job
  - none of the above

507. Repeatability of measuring equipment is
- the closeness with which a measurement can be read directly from a measuring instrument
  - a measure of how close the reading is to the true size
  - difference between measured value and actual value
  - the smallest change in measurand that can be measured
  - the capability to indicate the same reading again and again for a given measurand \*
508. The taper of internal dovetail can be measured with the help of
- sine bar
  - combination set
  - balls of standard dimensions and slip gauges \*
  - clinometer
  - dial gauge
509. External taper can be accurately measured with the help of
- sine bar and slip gauges \*
  - dividing head
  - precision balls and height gauge
  - combination set
  - clinometer
510. A sine bar is specified by
- its total length
  - the centre distance between the two rollers \*
  - the size of the rollers
  - the distance between rollers and upper surface
  - weight of sine bar
511. Profile of a gear tooth can be checked by
- sine bar
  - bench micrometer
  - optical pyrometer
  - optical projector \*
  - slip gauges
512. Gear tooth caliper is used to find the chordal thickness of following type of gear tooth
- spur gears \*
  - helical gears
  - worm gears
  - bevel gears
  - any type of gear
513. All the thread characteristics can be measured precisely with
- screw pitch gauge
  - micrometer with V anvil
  - tool room microscope \*
  - thread gauge
  - thread measuring machine
514. The advantage of vernier caliper over micrometer is that it
- is easier and quicker to use
  - is more accurate
  - can be used to make both inside and outside measurements over a range of sizes \*
  - all of the above
  - none of the above
515. The combination set can be used to
- check angular surfaces \*
  - draw circles and arcs
  - scribe lines
  - all of the above
  - none of the above
516. Before drilling at a point, it should be ensured that
- punch mark has been made at the point
  - position of point has been marked by two intersecting lines
  - centre drill has been used at the point \*
  - diameters have been located
  - surface is flat
517. In layout work, a pencil should not be used to draw lines on metal because
- it will wipe off easily
  - the line will be too wide for accurate work \*
  - the lines will smudge and be difficult to see
  - the lines do remain on metal even after good rubbing
  - all of the above
518. Surface plate is usually made of grey cast iron because it provides
- non wearing plate
  - very hard plate
  - easy to cast plate
  - lubrication due to graphite flakes \*
  - stable plate
519. Constant measuring pressure in micrometer screw gauges is ensured by
- locknut
  - barrel and thimble
  - spindle
  - spanner
  - ratched \*
520. Optical gauge work on the principle of
- refraction
  - reflection
  - dispersion
  - polarisation
  - interference of light rays \*
521. Millimeter scale in a micrometer is marked on
- barrel \*
  - thimble
  - spindle
  - anvil
  - ratchet
522. Circular scale of the micrometer is marked on
- anvil
  - barrel
  - ratchet
  - thimble \*
  - spindle
523. The following type of gauge has gauging sections combined on one end
- combination gauge
  - limit gauge
  - Go and No Go gauge
  - fixed gauge
  - progressive gauge \*

524. Gear tooth vernier is used to measure
- circular pitch
  - depth of tooth
  - tooth thickness
  - addendum and dedendum
  - pitch line thickness of tooth \*
525. Error of measuring equipment is
- the closeness with which a measurement can be read directly from a measuring instrument
  - a measure of how close the reading is to the true size
  - the difference between measured value and actual value \*
  - the smallest change in measurand that can be measured
  - the capability to indicate the same reading again and again for a given measurand
526. The two slip gauges in precision measurement are joined by
- assembling
  - sliding
  - adhesion
  - wringing \*
  - slipping
527. Plug gauges are used to
- measure the diameter of the workpiece
  - measure the diameter of the holes in the workpieces
  - check the diameter of the holes in the workpiece \*
  - check the length of the holes in the workpieces
  - check the outside diameter of workpieces
528. The term "allowance" in limits and fits is usually referred to
- minimum clearance between shaft and hole \*
  - maximum clearance between shaft and hole
  - difference of tolerance of hole and shaft
  - difference between maximum size and minimum size of the hole
  - difference between maximum size and minimum size of the shaft
529. Sensivity of measuring equipment is
- the closeness with which a measurement can be read directly from a measuring instrument
  - a measure of how close the reading is to the true size
  - the difference between measured value and actual value
  - the smallest change in measurand that can be measured \*
  - the capability to indicate the same reading again and again for a given measurand
530. Expressing a dimension as  $25.3^{-0.05}$  mm is the case of
- unilateral tolerance
  - bilateral tolerance \*
  - limiting dimensions
  - all of the above
  - none of the above
531. Surface roughness on a drawing is represented by
- triangles \*
  - circles
  - squares
  - rectangles
  - none of the above
532. No. of taps generally used in tapping by hand is
- one
  - two
  - three \*
  - four
  - more than three depending on the finish desired
533. Expressing a dimension as  $\frac{32.5}{32.3}$  mm is the case of
- unilateral tolerance
  - bilateral tolerance
  - limiting dimension \*
  - all of the above
  - none of the above
534. A bore of 14.67 mm in a workpiece can be measured by
- steel rule
  - vernier caliper
  - pneumatic gauge
  - micrometer \*
  - plug gauge
535. Ceramic tools inserts are fixed to tool holder by following process
- brazing \*
  - soldering
  - welding
  - clamping
  - casting
536. Sintering is used for
- fixing tool inserts on tool holders
  - manufacturing cutting tools
  - heating the powdered metal below its melting point\*
  - manufacturing powdered metal
  - casting
537. In banking operation, the force on punch depends upon
- sheet thickness
  - clearance
  - diameter of punch
  - all of the above \*
  - none of the above
538. Wire is fabricated by the following process
- drawing \*
  - extrusion
  - piercing
  - rolling
  - none of the above
539. In equation  $VT^n = C$ , value of n depends on
- material of workpiece
  - material of tool \*
  - condition of machine
  - working conditions
  - constant
540. With continuous chip cutting, maximum heat is taken by
- chip
  - tool
  - job
  - depends on velocity of cutting \*
  - none of the above



541. Shear angle is the angle between  
 a. shear plane and tool face  
 b. shear plane and job surface \*  
 c. shear plane and horizontal  
 d. shear plane and vertical  
 e. none of the above
542. The diameter of a finish turned shaft can best be checked with a  
 a. combination set  
 b. slip gauges  
 c. height gauge  
 d. micrometer screw gauge \*  
 e. dial indicator
543. One micron is equal to  
 a. 1 mm  
 b. 0.1 mm  
 c. 0.01 mm  
 d. 0.001 mm \*  
 e. 0.0001 mm
544. Accurate centring of work mounted in an independent chuck can be determined by using a  
 a. centre gauge  
 b. height gauge  
 c. dial indicator \*  
 d. surface gauge  
 e. micrometer
545. Which of the following is not the angle measuring device  
 a. angle plate \*  
 b. sine bar  
 c. bevel protector  
 d. angle gauge  
 e. combination square
546. To check the diameter of a twist drill with a micrometer, the measurement must be taken across the  
 a. margins of the drill \*  
 b. flutes of the drill  
 c. cutting edges of the drill  
 d. lips of the drill  
 e. web of the drill
547. Expressing a dimension as  $18.3^{+0.0}_{-0.2}$  mm is the case of  
 a. unilateral tolerance \*  
 b. bilateral tolerance  
 c. limiting dimensions  
 d. all of the above  
 e. none of the above
548. Commonly used units of feed in drilling operation are  
 a. mm  
 b. mm/rev. \*  
 c. mm/sec.  
 d. mm/mt  
 e. mm/hr.
549. Annealing is done by cooling in  
 a. air  
 b. furnace \*  
 c. water  
 d. brine  
 e. none of the above
550. The helical groove in drill is used  
 a. to dispose chip \*  
 b. to admit cutting fluid  
 c. to save material  
 d. to present sharp cutting edges  
 e. none of the above
551. The quickest type of chuck for centring operation is  
 a. three jaw \*  
 b. four jaw  
 c. pneumatic  
 d. magnetic  
 e. none of the above
552. Metal in electro-chemical grinding operation is removed by  
 a. abrasion and shear  
 b. electro-chemical decomposition  
 c. rusting and melting  
 d. electro-chemical decomposition and abrasion \*  
 e. ionisation and abrasion
553. The metal in electro-chemical machining process is removed by  
 a. ionisation and shearing  
 b. transfer of electrons  
 c. chemical action and abrasion  
 d. migration of ions towards the tool \*  
 e. electric discharge in strong solutions
554. In electro-discharge machining process  
 a. very high voltage of the order of kilovolts is applied across electrodes  
 b. current of the order 10,000 amps is passed through the work  
 c. continuous sparks to erode the metal are produced  
 d. upto around 250,000 sparks per second are produced \*  
 e. metal is removed at very fast rate
555. A complicated contour is to be made exactly in a carbide piece. Which process will be used  
 a. laser machining  
 b. electro-chemical milling  
 c. ultrasonic machining  
 d. electro-discharge machining \*  
 e. plasma-arc machining
556. The instruction on the tape of NC machine is prepared in the form of following system  
 a. numeric  
 b. alpha-numeric  
 c. binary numbers  
 d. binary coded decimal \*  
 e. coded form
557. NC machine tool is operated by  
 a. feedback system  
 b. output-input modules  
 c. a series of coded instructions \*  
 d. digitising  
 e. numerical controls
558. A combination of individual machine tools arranged sequentially and properly integrated and interlock is known as  
 a. production line  
 b. numerically controlled machine  
 c. machining centre  
 d. transfer machine \*  
 e. automat

559. Dielectric is a must in  
 a. EDM process \*      b. ECM process  
 c. ultrasonic machining      d. ion beam machining  
 e. laser machining
560. In EDM process, the work-piece is connected to  
 a. positive \*  
 b. negative  
 c. earth  
 d. any one of the above  
 e. none of the above
561. Reproduction of sharp corners is the limitation of  
 a. ECM      b. EDM \*  
 c. laser      d. plasma  
 e. none of the above
562. Broaching operation is frequently used in automobile industry because  
 a. it is an automatic machine \*  
 b. it is a mass production machine  
 c. semi-skilled operators can be employed  
 d. operation is completed in one stroke  
 e. high degree of finish and close tolerances are achieved
563. Very large speed ranges are required for  
 a. shaping machines  
 b. planing machines  
 c. semi-automatic and automatic turrets  
 d. grinding machines \*  
 e. drilling machines
564. For same tool life, maximum material per minute is removed by increasing  
 a. cutting speed      b. feed  
 c. depth of cut \*      d. tool hardness  
 e. clearance angle
565. The phenomenon of stick-slip is more predominant when the sliding speed is  
 a. zero  
 b. low \*  
 c. high  
 d. equal to the cutting speed  
 e. at all the speeds
566. The trade name given to a non-ferrous cast alloy composed of cobalt, chromium and tungsten is  
 a. satellite \*      b. HSS  
 c. boron carbide      d. ceramic  
 e. alnico
567. An important disadvantages of broaching process is  
 a. the broaching tools are always longer in length  
 b. only simple shapes can be obtained  
 c. the return stroke is always idle  
 d. the process is suitable only for high volume production \*  
 e. all of the above
568. Broaching tools are usually made of  
 a. high carbon steel  
 b. high speed steel (H.S.S.) \*  
 c. ceramics  
 d. tungsten carbide  
 e. stellite
569. The front teeth of a broach  
 a. remove no metal  
 b. remove maximum metal \*  
 c. remove minimum metal  
 d. perform the burnishing operation  
 e. guide the broach
570. For proper broaching operation at least following number of teeth should be in the work at a time  
 a. 1  
 b. 2  
 c. 3 \*  
 d. 4  
 e. more than four
571. A gear has to be subjected to shock and vibration. Following type should be selected  
 a. gear with full depth teeth  
 b. hybrid gears  
 c. bevel gears  
 d. gear with stub teeth \*  
 e. hardened gears
572. Thin gears from sheet metal can be produced commercially by  
 a. gear hobbing  
 b. gear shaping  
 c. extruding  
 d. machining  
 e. stamping \*
573. Which of the following is gear finishing process  
 a. gear shaving \*      b. gear hobbing  
 c. gear shaping      d. gear milling  
 e. gear extrusion
574. Which of the following is not a production process for gears  
 a. milling \*      b. stamping  
 c. hot rolling      d. extruding  
 e. broaching
575. Hobbing process is not suitable for cutting following type of gear  
 a. spur      b. helical  
 c. worm      d. bevel \*  
 e. all of the above
576. Formed milling operation of cutting gears can be used for cutting following type of gears  
 a. spur      b. bevel  
 c. worm      d. helical  
 e. all of the above \*

577. Gear forming operation can be performed by  
 a. shaping  
 b. milling  
 c. broaching  
 d. any one of the above \*  
 e. none of the above
578. Gear hobbing process is faster than milling because  
 a. indexing time is less  
 b. hob rotates faster  
 c. work rotates faster  
 d. plenty of lubricant is supplied in hobbing enabling faster operation  
 e. several teeth cut at a time \*
579. Gear cutting with a hob does not involve the following motions  
 a. indexing of the work \*  
 b. rotation of hob  
 c. rotation of blank  
 d. radial feed of hob  
 e. all of the above
580. Gear shaper can be used to cut following type of gear  
 a. internal  
 b. external  
 c. non conventional  
 d. accurate  
 e. all of the above \*
581. Milling method for gear cutting finds applications when following type of gears are to be cut  
 a. external                      b. internal  
 c. helical                        d. considerable variety \*  
 e. accurate
582. Which of the following can hold the work, locate the work and guide the drill at the desired position  
 a. drill bush                      b. drill fixture  
 c. metal locator                d. drill jig \*  
 e. V-block
583. A saw which cuts wood during the return stroke of the saw is known as  
 a. push saw  
 b. pull saw or draw saw \*
584. A mortise gauge is a  
 a. striking tool                      b. planning tool  
 c. boring tool                        d. marking tool \*
585. A rip saw  
 a. is a two man saw  
 b. is used for cutting along the grains of wood \*  
 c. has a narrow blade with two wooden handles  
 d. all of the above
586. A gimlet is a ..... tool.  
 a. boring \*                              b. marking
587. Which of the following statement is wrong ?  
 a. The mortise gauge has two scribing pins.  
 b. The gouges are chisels with a hollow shaped blade.  
 c. An auger is a planning tool \*
588. In order to cut mild steel, the cutting angle of chisel should be  
 a.  $30^{\circ}$                                       b.  $45^{\circ}$   
 c.  $50^{\circ}$                                       d.  $60^{\circ}$  \*
589. The cold chisels are made by  
 a. drawing                                b. rolling  
 c. piercing                                d. forging \*
590. The cold chisels are made from  
 a. cast iron                                b. mild steel  
 c. high speed steel                      d. cast tool steel \*
591. The cross-section of a chisel is usually  
 a. rectangular                            b. square  
 c. hexagonal                              d. octagonal \*
592. The cutting edge of a chisel should be  
 a. hardened                                b. tempered  
 c. hardened and tempered \*    d. case hardened
593. The chisel used for cutting keyways is  
 a. flat chisel                              b. cape chisel \*  
 c. round nose chisel  
 d. diamond pointed chisel
594. A diamond pointed chisel is used for cutting  
 a. flat surfaces                            b. grooves  
 c. key ways                                d. V-shaped grooves \*
595. For cutting brass, the hacksaw blade should have ..... teeth per 25 mm.  
 a. 14 \*                                        b. 24  
 c. 32                                         d. 40
596. A hacksaw blade cuts on the  
 a. forward stroke \*  
 b. return stroke  
 c. both forward and return strokes  
 d. cutting depends upon the direction of force
597. The width of slot cut by a hacksaw blade is ..... the width of the blade.  
 a. equal to                                b. less than  
 c. greater than \*
598. The length of hacksaw blade is the distance between the outside edges of the holes which fits over the pins.  
 a. Agree \*                                b. Disagree
599. The teeth of hacksaw blade are bent  
 a. towards right  
 b. towards left  
 c. alternately towards right and left and every third or fourth left straight \*  
 d. may be bent in any direction

600. A hacksaw blade is specified by its  
 a. length \*                                      b. material  
 c. width                                              d. number of teeth
601. To prevent the body of the blade from jamming in the saw cut, the teeth of blade are  
 a. strengthened                                      b. sharpened  
 c. set \*                                              d. all of these
602. A file with 20 teeth in 25 mm is called  
 a. rough file \*                                      b. bastard file  
 c. second cut file                                      d. smooth file
603. A file with 50 - 60 teeth in 25 mm is called bastard file  
 a. True                                              b. False \*
604. When the file is moved to and fro over the work, it is known as  
 a. cross filing                                      b. draw filing \*  
 c. pull and push filing                                      d. none of these
605. When filing soft metals, the file teeth are clogged with minute particles of metal. The file should be cleaned by  
 a. washing it with water  
 b. rubbing on wood  
 c. washing it with dilute acid  
 d. using file card \*
606. A file removes the metal during  
 a. forward stroke \*  
 b. return stroke  
 c. both forward and return stroke  
 d. none of these
607. The type of file used for a wood work is  
 a. single-cut file                                      b. double cut file  
 c. rasp-cut file \*                                      d. any one of these
608. V-block is used to  
 a. check the trueness of flat surfaces  
 b. locate centres of round tools  
 c. check the surface roughness  
 d. none of these \*
609. Surface plate is used to check the trueness of flat surfaces.  
 a. Agree \*                                              b. Disagree
610. Scribing block is used to  
 a. hold the round bars during marking  
 b. check the trueness of flat surfaces  
 c. locate the centres of round bars \*  
 d. check the surface roughness
611. The instrument used to measure external and internal diameter of shafts, thickness of parts and depth of holes, is  
 a. outside micrometer                                      b. inside micrometer  
 c. depth gauge micrometer                                      d. vernier caliper \*
612. The instrument which has all the features of try-square, bevel protractor, rule and scriber, is  
 a. outside micrometer                                      b. inside micrometer  
 c. depth gauge micrometer                                      d. combination set \*
613. The accuracy of micrometers, calipers, dial indicators can be checked by a  
 a. feeler gauge                                              b. slip gauge \*  
 c. ring gauge                                              d. plug gauge
614. A progressive limit gauge has  
 a. 'Go' and 'Not go' member on the same side of the gauge \*  
 b. separate 'Go' and 'Not go' member  
 c. 'Go' member at one end 'Not go' member at the other end  
 d. none of the above
615. A ring gauge is used to  
 a. check the diameter of shafts or studs \*  
 b. test the accuracy of holes  
 c. check the clearance between two mating surfaces  
 d. all of the above
616. A plug gauge is used to check the diameter of shafts and studs  
 a. Right                                              b. Wrong \*
617. In order to check the clearance between two mating surfaces, a ..... gauge should be used  
 a. ring                                              b. plug  
 c. feeler \*                                              d. none of these
618. The difference between the upper limit and lower limit of a dimension is called  
 a. nominal size                                              b. basic size  
 c. actual size                                              d. tolerance \*
619. The algebraic difference between the maximum limit and the basic size is called  
 a. actual deviation  
 b. upper deviation \*  
 c. lower deviation  
 d. fundamental deviation
620. The algebraic difference between the minimum limit and the basic size is called  
 a. actual deviation  
 b. upper deviation  
 c. lower deviation \*  
 d. fundamental deviation
621. In a unilateral system of tolerance, the tolerance is allowed on  
 a. one side of the actual size  
 b. one side of the nominal size \*  
 c. both sides of the actual size  
 d. both sides of the nominal size

622. In a bilateral system of tolerance, the tolerance is allowed on  
 a. one side of the actual size  
 b. one side of the nominal size  
 c. both sides of actual size  
 d. both sides of the nominal size \*
623. A basic shaft is one whose  
 a. lower deviation is zero \*  
 b. upper deviation is zero  
 c. lower and upper deviations are zero  
 d. none of these
624. According to Indian standard specifications, 100 H6/g 5 means that  
 a. basic size is 100 mm \*  
 b. actual size is 100 mm  
 c. difference between the actual size and basic size is 100 mm  
 d. none of the above
625. According to Indian standards, the total number of tolerance grades are  
 a. 8  
 b. 12  
 c. 18 \*  
 d. 20
626. When the dimension is expressed as  $20_{-0.025}^{+0.035}$ , then the tolerance is  
 a. 0.035 mm  
 b. 0.025 mm  
 c. 0.01 mm  
 d. 0.06 mm \*
627. When the dimension is expressed as  $20_{-0.025}^{+0.035}$ , then the basic size is  
 a. 20 mm \*  
 b. 20.035 mm  
 c. 20.025 mm  
 d. 19.975 mm
628. In orthogonal cutting of metals,  
 a. the cutting edge of the tool is perpendicular to the direction of tool travel \*  
 b. the cutting forces occur in two directions only  
 c. the cutting edge is wider than the depth of cut  
 d. all of the above
629. In an orthogonal cutting, the depth of cut is halved and the feed rate is double. If the chip thickness ratio is unaffected with the changed cutting conditions, the actual chip thickness will be  
 a. doubled \*  
 b. halved  
 c. quadrupled  
 d. unchanged
630. In oblique cutting of metals, the cutting edge of the tool is  
 a. perpendicular to the workpiece  
 b. perpendicular to the direction of tool travel  
 c. parallel to the direction of tool travel  
 d. inclined at an angle less than  $90^\circ$  to the direction of tool travel \*
631. Discontinuous chips are formed during machining of  
 a. brittle metals \*  
 b. ductile metals  
 c. hard metals  
 d. soft metals
632. The ductile materials, during machining, produce  
 a. continuous chips  
 b. discontinuous chips  
 c. continuous chips with built up edge  
 d. either a. or c.\*
633. Continuous chips with built up edge are formed during machining of  
 a. brittle metals  
 b. ductile metals \*  
 c. hard metals  
 d. soft metals
634. The factor responsible for the formation of discontinuous chips is  
 a. low cutting speed and large rake angle  
 b. low cutting speed and small rake angle \*  
 c. high cutting speed and large rake angle  
 d. high cutting speed and small rake angle
635. The high cutting speed and large rake angle of the tool will result in the formation of  
 a. continuous chips \*  
 b. discontinuous chip  
 c. continuous chips with built up edge  
 d. none of the above
636. The factor responsible for the formation of continuous chips with built up edge is  
 a. low cutting speed and large rake angle  
 b. low cutting speed and small rake angle \*  
 c. high cutting speed and large rake angle  
 d. high cutting speed and small rake angle
637. In continuous chip cutting, the maximum heat is taken by the cutting tool  
 a. Yes  
 b. No \*
638. In continuous chip cutting, the maximum heat ..... the velocity of cutting  
 a. depends upon \*  
 b. does not depend upon
639. The continuous chips are in the form of long coils having the same thickness throughout.  
 a. Agree \*  
 b. Disagree
640. In oblique cutting system, the maximum chip thickness  
 a. occurs at the middle  
 b. may not occur at the middle \*  
 c. depends upon the material of the tool  
 d. depends upon the geometry of the tool
641. In oblique cutting system, the cutting edge of the tool  
 a. may clear the width of the workpiece  
 b. may or may not clear the width of the workpiece  
 c. may not clear the width of the workpiece \*  
 d. should always clear the width of the workpiece

642. Which of the following statement is correct for orthogonal cutting system ?
- The cutting edge of the tool is perpendicular to the direction of tool travel.
  - The cutting edge clears the width of the workpiece on either ends.
  - The chip flows over the face tool and direction of the chip flow velocity is normal to the cutting edge.
  - all of the above \*
643. In orthogonal cutting system, the maximum chip thickness occurs at the middle
- Correct \*
  - Incorrect
644. Which of the following parameters govern the value of shear angle in continuous chip formation ?
- True fee
  - Chip thickness
  - Rake angle of the cutting tool
  - all of these \*
645. Which of the following statement is correct for oblique cutting system ?
- The cutting edge is inclined at an angle less than  $90^\circ$  with the normal to the velocity of the tool.
  - Frequently, more than one cutting edges are in action.
  - The chip flows on the tool face at an angle less than  $90^\circ$  with the normal on the cutting edge.
  - all of the above \*
646. In oblique cutting system, the tool may or may not generate a surface parallel to the workface.
- Yes \*
  - No
647. In oblique cutting system, the maximum chip thickness occurs at the middle
- Right
  - Wrong \*
648. The addition of lead, sulphur and phosphorus to low carbon steels, help to
- reduce built up edge
  - break up chips
  - improve machinability
  - all of these \*
649. In determining the various forces on the chip, Merchant assumed that the
- cutting edge of the tool is sharp and it does not make any flank contact with the workpiece
  - only continuous chip without built-up-edge is produced
  - cutting velocity remains constant
  - all of the above \*
650. Cast iron during machining produces
- continuous chips
  - discontinuous chip \*
  - continuous chips with built-up-edge
  - none of these
651. Mild steel during machining produces ..... chips.
- continuous \*
  - discontinuous
652. When the cutting edge of the tool is dull, then during machining
- continuous chips are formed
  - discontinuous chips are formed
  - continuous chips with built-up edge are formed \*
  - no chips are formed
653. If the cutting speed is increased, then the built-up-edge
- becomes longer
  - may or may not form
  - becomes smaller and finally does not form at all \*
  - has nothing to do with speed
654. In metal cutting operations, the shear angle is the angle made by the shear plane with the
- direction of the tool axis
  - direction of tool travel \*
  - perpendicular to the direction of the tool axis
  - central plane of the workpiece
655. In metal cutting, use of low feeds and high cutting speeds is desired when the objective is
- high metal removal rate
  - dry machining
  - use of soft cutting tool
  - surface finish \*
656. The velocity of tool relative to the workpiece is known as cutting velocity.
- True \*
  - False
657. The velocity of tool along the tool face is known as
- shear velocity
  - chip velocity \*
  - cutting velocity
  - mean velocity
658. The shear velocity is the velocity of
- tool relative to the workpiece
  - chip relative to the tool
  - tool along the tool face
  - none of these \*
659. The vector sum of cutting velocity and chip velocity is ..... shear velocity
- equal to \*
  - less than
  - more than
660. In metal cutting operations, chips are formed due to plastic deformation of the metal.
- Agree \*
  - Disagree
661. Segmental chips are formed during machining
- mild steel
  - cast iron \*
  - high speed steel
  - high carbon steel
662. In metal machining, the zone where the maximum heat is generated due to the plastic deformation of metal, is called
- friction zone
  - work-tool contact zone
  - shear zone \*
  - none of these

663. In metal machining, the zone where the heat is generated due to friction between the moving chip and the tool face, is called
- friction zone \*
  - work-tool contact zone
  - shear zone
  - none of these
664. The material which on machining produces chips with built up edge is
- brittle material
  - tough material
  - hard material
  - ductile material \*
665. In metal machining, the work tool contact zone is a zone where heat is generated due to
- plastic deformation of metal
  - burnishing friction \*
  - friction between the moving chip and the tool face
  - none of the above
666. A dynamometer is a device used for the measurement of
- chip thickness ratio
  - forces during metal cutting \*
  - wear of the cutting tool
  - deflection of the cutting tool
667. The type of tool used on lathe, shaper and planer is
- single point cutting tool \*
  - two point cutting tool
  - three point cutting tool
  - multi point cutting tool
668. The type of tool used on milling machine and broaching machine is
- single point cutting tool
  - two point cutting tool
  - three point cutting tool
  - multi-point cutting tool \*
669. A single point tool has
- rake angle
  - cutting angle
  - lip angle
  - all of these \*
670. The part of the tool on which cutting edge is formed is called nose
- Right
  - Wrong \*
671. The angle between the shear plane and ..... is called shear angle
- work surface \*
  - tool face
672. The angle made by the face of the tool and the plane parallel to the base of cutting tool is called
- rake angle \*
  - cutting angle
  - clearance angle
  - lip angle
673. The angle between the face and flank of the single point cutting tool is known as
- rake angle
  - clearance angle
  - lip angle \*
  - point angle
674. The lip angle is the angle
- between the tool face and the ground end surface of flank \*
  - made by the face of the tool and the plane parallel to the base of cutting tool
  - between the face of the tool and a line tangent to the machined surface at the cutting point
  - none of the above
675. The angle between the face of the tool and a line tangent to the machined surface at the cutting point is called cutting angle
- Correct \*
  - Incorrect
676. The angle on which the strength of the tool depends is
- rake angle \*
  - cutting angle
  - clearance angle
  - lip angle
677. The lip angle of a single point tool is usually
- $20^{\circ}$  to  $40^{\circ}$
  - $40^{\circ}$  to  $60^{\circ}$
  - $60^{\circ}$  to  $80^{\circ}$  \*
  - none of these
678. Carbide tipped tools usually have
- negative rake angle \*
  - positive rake angle
  - any rake angle
  - no rake angle
679. The rake angle required to machine brass by high speed steel tool is
- $0^{\circ}$  \*
  - $10^{\circ}$
  - $20^{\circ}$
  - $-10^{\circ}$
680. The negative rake is usually provided on
- high carbon steel tool
  - high speed steel tools
  - cemented carbide tools \*
  - all of these
681. A single point thread cutting tools should ideally have
- zero rake angle \*
  - positive rake angle
  - negative rake angle
  - point angle
682. Which of the following statement is correct about nose radius ?
- It improves tool life
  - It improves the surface finish
  - both a. and b. \*
  - none of these
683. In American Standard Association (A S A) system, if the tool nomenclature is 8 -6 -5 -5 -10 -15 -2 mm, then the side rake angle will be
- $5^{\circ}$
  - $6^{\circ}$  \*
  - $8^{\circ}$
  - $10^{\circ}$
684. Cemented carbide tools are generally poor in shear
- Yes \*
  - No
685. Cemented carbide tool tips are produced by powder metallurgy.
- True \*
  - False

686. The correct sequence of tool material in increasing order of their ability to retain their hot hardness is  
 a. carbide, ceramic, cermet, borazon  
 b. ceramic, carbide, borazon, cermet  
 c. cermet, carbide, ceramic, borazon \*  
 d. borazon, ceramic, carbide, cermet
687. The binding material used in cemented carbide tool is  
 a. tungsten  
 b. chromium  
 c. silicon  
 d. cobalt \*
688. The rate of removing metal is ..... by increasing the depth of cut.  
 a. decreased  
 b. increased \*
689. Side relief angle of a single point tool is the angle  
 a. by which the face of the tool is inclined towards back  
 b. by which the face of the tool is inclined sideways  
 c. between the surface of the flank immediately below the point and a plane at right angle to the centre line of the point of tool \*  
 d. between the surface of the flank immediately below the point and a line drawn from the point perpendicular to the base
690. In a single point tool, the angle between the surface of the flank immediately below the point and a line drawn from the point perpendicular to the base, is known as  
 a. side relief angle  
 b. end relief angle \*  
 c. back rake angle  
 d. side rake angle
691. Back rake angle of a single point tool is the angle by which the face of the tool is inclined towards back  
 a. Agree \*  
 b. Disagree
692. Side rake angle of a single point cutting tool is the angle  
 a. by which the face of the tool is inclined towards back  
 b. by which the face of the tool is inclined sideways\*  
 c. between the surface of the flank immediately below the point and a plane at right angles to the centre line of the point of the tool  
 d. between the surface of the flank immediately below the point and line drawn from the point perpendicular to the base
693. Relief angles on high speed steel tools usually vary from  
 a.  $0^{\circ}$  to  $3^{\circ}$   
 b.  $3^{\circ}$  to  $10^{\circ}$   
 c.  $10^{\circ}$  to  $20^{\circ}$   
 d.  $20^{\circ}$  to  $30^{\circ}$  \*
694. In order to prevent tool from rubbing the work ..... on tools are provided  
 a. rake angles  
 b. relief angles \*
695. Side rake angle on tools is provided to control chip flow.  
 a. True \*  
 b. False
696. Larger than  $15^{\circ}$  side cutting edge angle  
 a. increases tool life  
 b. decreases tool life  
 c. produces chipping and decreases tool life \*  
 d. results in excessive stress concentration and greater heat generation
697. Small nose radius  
 a. increases tool life  
 b. decreases tool life  
 c. produces chipping and decreases tool life  
 d. results in excessive stress concentration and greater heat generation \*
698. Which of the following statement is wrong ?  
 a. The larger side rake angle produces chipping  
 b. The smaller rake angle produces excessive wear and deformation in tool.  
 c. The side cutting edge angle (less than  $15^{\circ}$ ) increases tool life  
 d. The increase in nose radius decreases tool life.\*
699. The thrust force will increase with the increase in  
 a. side cutting edge angle \*  
 b. tool nose radius  
 c. rake angle  
 d. end cutting edge angle
700. Negative rakes are used for  
 a. carbide tools  
 b. heavy loads  
 c. harder materials  
 d. all of these \*
701. Match the correct answer from *Group B* for the statement given in *Group A*.
- | <i>Group A</i>                                                 | <i>Group B</i>                       |
|----------------------------------------------------------------|--------------------------------------|
| i. Lip angle is usually                                        | (A) $0^{\circ}$ (ii)                 |
| ii. Rake angle for machining brass by high speed steel tool is | (B) $3^{\circ}$ to $5^{\circ}$ (iii) |
| iii. Relief angle on high speed steel tools vary from          | (C) $3^{\circ}$ to $10^{\circ}$ (iv) |
| iv. Relief angle on carbide tipped tool is                     | (D) $60^{\circ}$ to $80^{\circ}$ (i) |
702. Crater wear occurs mainly on the  
 a. nose part, front relief face and side relief face of the cutting tool  
 b. face of the cutting tool at a short distance from the cutting edge only \*  
 c. cutting edge only  
 d. front face only
703. Flank wear depends upon the  
 a. hardness of the work and tool material at the operating temperature  
 b. amount and distribution of hard constituents in the work material \*  
 c. degree of strain hardening in the chip  
 d. all of these





725. In machining metals, surface roughness is due to  
 a. feed marks or ridges left by the cutting tool  
 b. fragment of built-up edge on the machined surfaces  
 c. cutting tool vibrations  
 d. all of these \*
726. The surface finish is improved by the increase in  
 a. cutting speed                      b. nose radius  
 c. true rake angle                    d. all of these \*
727. The increase in depth of cut and feed rate ..... surface finish  
 a. improves                            b. deteriorates \*  
 c. does not effect
728. With the same tool life, the maximum material per minute is removed by  
 a. increasing the cutting speed  
 b. decreasing the cutting speed  
 c. increasing the depth of cut \*  
 d. increasing the feed rate
729. In machining soft material, a tool with negative relief angle is used  
 a. Right \*                                b. Wrong
730. High speed steel cutting tools operate at cutting speeds ..... than carbon steel tools.  
 a. 2 to 3 times lower                b. 2 to 3 times high \*  
 c. 5 to 8 times higher                d. 8 to 20 times higher
731. The tool material, for faster machining, should have  
 a. wear resistance                    b. red hardness  
 c. toughness                            d. all of these \*
732. Carbon tool steels have low-heat and wear-resistance  
 a. Correct \*                              b. Incorrect
733. High speed steel tools retain their hardness upto a temperature of  
 a. 250<sup>o</sup>C                                  b. 350<sup>o</sup>C  
 c. 500<sup>o</sup>                                      d. 900<sup>o</sup>C \*
734. The trade name of non-ferrous cast alloy composed of cobalt, chromium and tungsten is called  
 a. ceramic                                b. stellite \*  
 c. diamond                                d. cemented carbide
735. Stellite preserve hardness upto a temperature of  
 a. 350<sup>o</sup>C                                  b. 500<sup>o</sup>C  
 c. 900<sup>o</sup>C                                    d. 1100<sup>o</sup>C \*
736. Ceramic tools are fixed to tool body by  
 a. soldering                                b. brazing \*  
 c. welding                                 d. clamping
737. Ceramic tools has greater tool life than carbide tools  
 a. True \*                                    b. False
738. The tool made of cemented carbide wear out faster at  
 a. slow speeds \*                         b. medium speeds  
 c. fast speeds                              d. very fast speeds
739. The carbide tools operating at very low cutting speeds (below 30 m / min)  
 a. reduces tool life \*  
 b. increases tool life  
 c. have no effect on tool life  
 d. spoils the work piece
740. Which of the following statement is wrong ?  
 a. The diamond is the hardest tool material and can run at cutting speeds about 50 times that of high speed steel tool  
 b. The ceramic tools can be used at cutting speeds 40 times that of high speed steel tools  
 c. The cemented carbide tools can be used at cutting speeds 10 times that of high speed steel tools  
 d. The ceramic tools can withstand temperature upto 600<sup>o</sup>C only \*
741. As the cutting speed increases, the tool cutting forces  
 a. remain constant  
 b. increases  
 c. decreases \*  
 d. first increases and then decreases
742. Ceramic cutting tools are  
 a. made by cold pressing of aluminium oxide powder  
 b. available in the form of tips  
 c. brittle and have low bending strength  
 d. all of these \*
743. Cutting fluids are used to  
 a. cool the tool  
 b. improve surface finish  
 c. cool the workpiece  
 d. all of these \*
744. The cutting fluid mostly used for machining steel is  
 a. water                                    b. soluble oil \*  
 c. dry                                        d. heavy oils
745. In machining cast iron, no cutting fluid is required  
 a. Right \*                                 b. Wrong
746. The cutting fluids mostly used for machining alloy steel is  
 a. water  
 b. soluble oil  
 c. dry  
 d. sulphurised mineral oil \*
747. A numerical method of identification of tool is known as tool signature  
 a. Correct \*                                b. Incorrect
748. Tool signature consists of ..... elements  
 a. two                                        b. four  
 c. five                                        d. seven \*

749. Chip breakers are used to  
 a. increase tool life  
 b. remove chips from bed  
 c. break the chips into short segments \*  
 d. to minimize heat generation
750. The factor which affects the tool life is  
 a. tool geometry                      b. cutting speed  
 c. feed rate                              d. all of these \*
751. Larger end cutting edge angle ..... tool life.  
 a. increases \*  
 b. decreases  
 c. does not effect
752. The tool life ..... as the cutting speed increases.  
 a. decreases \*                      b. increases
753. Cutting fluid has no effect on the tool life  
 a. True                                      b. False \*
754. The tool life, in case of continuous cutting, is much better than intermittent cutting.  
 a. Agree \*                              b. Disagree
755. If the grain size is ..... the tool life is better.  
 a. smaller                              b. larger \*
756. The tool life is said to be over if  
 a. poor surface finish is obtained  
 b. there is sudden increase in cutting forces and power consumption  
 c. over heating and fuming due to heat of friction starts  
 d. all of the above \*
757. The tool life is affected by  
 a. depth of cut                      b. cutting speed  
 c. feed                                      d. all of these \*
758. The relation between the tool life ( $T$ ) in minutes and cutting speed ( $V$ ) in m / min is  
 a.  $V^n T = C$                               b.  $VT^n = C$  \*  
 c.  $V^n / T = C$                               d.  $V / T^n = C$   
 Where  $n =$  An exponent, which depends upon the tool and workpiece, and  
 $C =$  A constant
759. As the cutting speed increases, tool life decreases  
 a. Yes \*                                      b. No
760. Tool life is measured by the  
 a. number of pieces machined between tool sharpenings  
 b. time the tool is in contact with the job  
 c. volume of material removed between tool sharpenings  
 d. all of the above \*
761. The relation between tool life ( $T$ ) and cutting speed ( $V$ ) is  $VT^n = \text{Constant}$ . In this relation, the value of  $n$  depends upon  
 a. work material  
 b. tool material \*  
 c. working conditions  
 d. type of chip produced
762. In the relation  $VT^n = C$ , the value of  $n$  for high speed steel tools varies from 0.25 to 0.40.  
 a. Agree                                      b. Disagree \*
763. In the relation  $VT^n = C$ , the value of  $n$  for carbide tools is  
 a. 0.1 to 0.2                              b. 0.20 to 0.25 \*  
 c. 0.25 to 0.40                              d. 0.40 to 0.55
764. In the relation  $VT^n = C$ , the value of  $n$  for ceramic tools is  
 a. 0.1 to 0.2                              b. 0.20 to 0.25  
 c. 0.25 to 0.40                              d. 0.40 to 0.55 \*
765. The tool life is ..... cutting speed  
 a. independent of  
 b. dependent upon \*
766. The correct sequence of the following parameters in order of their maximum to minimum influence on tool life is  
 a. feed rate, depth of cut, cutting speed  
 b. depth of cut, cutting speed, feed rate  
 c. cutting speed, feed rate, depth of cut \*  
 d. feed rate, cutting speed, depth of cut
767. In a single point turning operation with a cemented carbide and steel combination having a Taylor exponent of 0.25, if the cutting speed is halved, then tool life will become  
 a. half                                      b. two times \*
768. Tool life is generally better when  
 a. grain size of the metal is large \*  
 b. grain size of metal is small  
 c. hard constituents are present in the microstructure of the tool material  
 d. none of the above
769. In a centre lathe, the cutting tool is fed in ..... with reference to the lathe axis  
 a. cross direction only  
 b. longitudinal direction only  
 c. both cross and longitudinal direction \*  
 d. any direction
770. The size of a lathe is specified by the  
 a. length between centres  
 b. swing diameter over the bed  
 c. swing diameter over the carriage  
 d. all of these \*

771. The swing diameter over the bed is ..... the height of the centre measured from the bed of the lathe  
 a. equal to                                      b. twice \*  
 c. thrice                                              d. one-half
772. The swing diameter over carriage is always less than the swing diameter over bed  
 a. Yes \*                                              b. No
773. Hard and tough materials like cast iron should be turned at  
 a. slow speed \*  
 b. high speed  
 c. any speed  
 d. certain specific speed
774. Lathe bed is made of  
 a. mild steel  
 b. alloy steel  
 c. pig iron  
 d. chilled cast iron \*
775. Tumbler gears in lathe are used to  
 a. reduce the spindle speed  
 b. cut gears  
 c. give desired direction of movement to the lathe carriage \*  
 d. drill a workpiece
776. Half nut is used to lock the lathe carriage to the lead screw for thread cutting  
 a. True \*                                              b. False
777. The lathe centres are provided with standard taper known as  
 a. Morse taper \*  
 b. Seller's taper  
 c. Chapman taper  
 d. Brown and Sharpe taper
778. The chuck used for setting up of heavy and irregular shaped work should be  
 a. four jaw independent chuck \*  
 b. three jaw universal chuck  
 c. magnetic chuck  
 d. drill chuck
779. A mandrel is used to hold  
 a. an eccentric work                              b. a heavy work  
 c. a thin work                                              d. none of these \*
780. For turning small taper on long workpiece, the suitable method is  
 a. by a form tool  
 b. by setting over the tail stock \*  
 c. by a taper turning attachment  
 d. by swivelling the compound rest
781. The tailstock set over required to turn a taper on the entire length of a workpiece having diameters D and d is  
 a.  $\frac{D-d}{2L}$                                               b.  $\frac{D-d}{L}$   
 c.  $\frac{D-d}{2}$  \*                                              d. D - d
782. For turning internal tapers, the suitable method is  
 a. by a form tool  
 b. by setting over the tail stock  
 c. by a taper turning attachment \*  
 d. by swivelling the compound rest
783. The tail stock set over method of taper turning is preferred for  
 a. internal tapers                                      b. small tapers  
 c. long slender tapers \*                              d. steep tapers
784. A feed gear box for a screw cutting lathe is designed on the basis of  
 a. geometric progression \*  
 b. arithmetic progression  
 c. harmonic progression  
 d. none of these
785. Slow speed of the spindle is necessary in  
 a. thread cutting  
 b. turning a work of larger diameter  
 c. turning a hard or tough material  
 d. all of these \*
786. When the backgear is engaged in a backgeared headstock, the spindle speed reduces considerably.  
 a. Agree \*                                              b. Disagree
787. A lathe with four steps on the cone pulley and with backgears will have  
 a. four direct speeds  
 b. four indirect speeds  
 c. four direct and four indirect speeds \*  
 d. eight indirect speeds
788. The tail stock and the carriage of a lathe may be guided on same or different guideways.  
 a. True \*                                              b. False
789. When the tool moves parallel to the lathe axis, the movement is termed as  
 a. cross feed                                              b. angular feed  
 c. longitudinal feed \*                                      d. any one of these
790. The chuck preferred for quick setting and accurate centering of a job is  
 a. four jaw independent chuck  
 b. collet chuck \*  
 c. three jaw universal chuck  
 d. magnetic chuck

791. The guideways are of  
a. flat type  
b. V-type  
c. dovetail type  
d. any one of these \*
792. The taper on the lathe spindle is  
a. 1 in 10  
b. 1 in 15  
c. 1 in 20 \*  
d. 1 in 30
793. The lathe spindles at the nose end have  
a. Internal screw threads  
b. External screw threads \*  
c. No threads  
d. Tapered threads
794. The angle between the lathe centres is  
a.  $30^\circ$   
b.  $45^\circ$   
c.  $60^\circ$  \*  
d.  $90^\circ$
795. The lathe spindles are usually made hollow and provided with  
a. internal taper \*  
b. external taper  
c. internal and external taper  
d. no taper
796. In case of turning, as the machining proceeds, the spindle speed must ..... with the decrease in diameter of work  
a. decrease  
b. increase \*
797. The different spindle speeds on a lathe form  
a. arithmetical progression  
b. geometrical progression \*  
c. harmonical progression  
d. any one of these
798. The chamfering is an operation of  
a. bevelling the extreme end of a workpiece \*  
b. embossing a diamond shaped pattern on the surface of a workpiece  
c. reducing the diameter of a workpiece over a very narrow surface  
d. enlarging the end of a hole cylindrically
799. An operation of enlarging the end of a hole cylindrically is known as grooving.  
a. Right  
b. Wrong \*
800. The grooving is an operation of  
a. bevelling the extreme end of a workpiece  
b. embossing a diamond shaped pattern on the surface of a workpiece  
c. reducing the diameter of a workpiece over a very narrow surface \*  
d. enlarging the end of a hold cylindrically
801. The facing is an operation of  
a. bevelling the extreme end of a workpiece  
b. embossing a diamond shaped pattern on the surface of a workpiece  
c. reducing the diameter of a workpiece over a very narrow surface  
d. machining the ends of a workpiece to produce a flat surface square with the axis \*
802. An operation of embossing a diamond shaped pattern on the surface of a workpiece, is known as  
a. counter-boring  
b. grooving  
c. knurling \*  
d. facing
803. The chamfering is an essential operation after  
a. knurling  
b. rough turning  
c. boring  
d. thread cutting \*
804. The lead screw of a lathe has ..... threads  
a. single start \*  
b. double start  
c. multi-start  
d. any one of these
805. The maximum production of small and slender parts is done by  
a. watch maker's lathe  
b. sliding head stock automatic lathe  
c. multispindle automatic lathe \*  
d. capstan lathe
806. A right hand tool on a lathe cuts most efficiently when it travels  
a. from left to right end of the lathe bed  
b. from right to left end of the lathe bed \*  
c. with the help of a compound slide  
d. across the bed
807. A left hand tool on a lathe cuts most efficiently when it travels  
a. from left to right end of the lathe bed \*  
b. from right to left end of the lathe bed  
c. with the help of a compound slide  
d. across the bed
808. The width of cutting edge of a parting-off tool varies from  
a. 3 to 12 mm \*  
b. 5 to 20 mm  
c. 8 to 30 mm  
d. 15 to 40 mm
809. A round nose tool has no back rake and side rake  
a. Correct \*  
b. Incorrect
810. A round nose tool may be fed either from left to right end or from right to left end of the lathe bed  
a. Yes \*  
b. No
811. In order to achieve a specific surface finish in single point turning, the most important factor to be controlled is  
a. depth of cut  
b. cutting speed \*  
c. feed  
d. tool rake angle
812. The average cutting speed for turning mild steel with a high speed steel tool is  
a. 15 to 19 m/min  
b. 25 to 31 m/min \*  
c. 60 to 90 m/min  
d. 90 to 120 m/min
813. The average cutting speed for turning brass with a high speed steel tool is  
a. 15 to 19 m/min  
b. 25 to 31 m/min  
c. 60 to 90 m/min \*  
d. 90 to 120 m/min



834. In which of the following machine, the work rotates and the tool is stationary ?
- Vertical boring machine \*
  - Horizontal boring machine
  - Precision boring machine
  - Jig boring machine
835. The ratio between two consecutive spindle speeds for a six-speed drilling machine using drills of diameter 6.25 to 25 mm size and at a cutting velocity of 18 m / min is
- 1.02
  - 1.32 \*
  - 1.66
  - 1.82
836. The main purpose of a boring operation, as compared to drilling, is to
- drill a hole
  - finish the drilled hole
  - correct the hole
  - enlarge the existing hole \*
837. The time (in minutes) for a drilling a hole is given by
- $$t = \frac{\text{Depth of the hole} + h}{\text{feed} \times \text{R.P.M.}}$$
- where h is the
- length of the drill
  - drill diameter
  - flute length of the drill
  - cone height of the drill \*
838. A drill bit of 20 mm diameter rotating at 500 r.p.m. with a feed rate of 0.2 mm / revolution is used to drill a through-hole in a mild steel plate 20 mm thickness. The depth of cut in this drilling operation is
- 0.2 mm
  - 10 mm
  - 20 mm \*
  - 100 mm
839. The effect of setting a boring tool above centre height leads to
- increase in the effective rake angle and a decrease in the effective clearance angle \*
  - increase in both effective rake angle and a effective clearance angle
  - decrease in the effective rake angle and an increase in the effective clearance angle
  - decrease in both effective rake angle and effective clearance angle
840. In reaming process
- metal removal rate is high
  - high surface finish is obtained
  - high form accuracy is obtained \*
  - high dimensional accuracy is obtained
841. A hole of 30 mm diameter is to be produced by reaming. The minimum diameter permissible is 30.00 mm while the maximum permissible diameter is 30.05 mm. In this regard, which of the following statement about the reamer size is correct ?
- The minimum diameter of the reamer can be less than 30 mm \*
  - The maximum diameter of the reamer must be less than 30.05 mm
  - The minimum diameter of the reamer cannot be less than 30 mm
  - The maximum diameter of the reamer can be more than 30.05 mm
842. The enlarging of an existing circular hole with a rotating single point tool is called
- boring \*
  - drilling
  - reaming
  - internal turning
843. In a shaper
- tool is stationary and work reciprocates
  - work is stationary and tool reciprocates \*
  - tool moves over stationary work
  - tool moves over reciprocating work
844. In a planer
- tool is stationary and work reciprocates \*
  - work is stationary and tool reciprocates
  - tool moves over stationary work
  - tool moves over reciprocating work
845. In a shaper, the metal is removed during
- forward stroke \*
  - return stroke
  - both the forward and return strokes
  - neither the forward nor the return stroke
846. The operation performed on a shaper is
- machining horizontal surface
  - machining vertical surface
  - machining angular surface
  - all of these \*
847. The keyways, grooves and slots cannot be cut on a shaper
- True
  - False \*
848. Gears can be cut on a shaper
- Agree \*
  - Disagree
849. The top and sides of the table of a shaper usually have
- L-type slots
  - T-type slots \*
  - I-type slots
  - any one of these
850. The size of a shaper is given by
- stroke length \*
  - motor power
  - mass of machine
  - rate size

851. In a shaper, the length of stroke is increased by
- increasing the centre distance of bull gear and crank pin \*
  - decreasing the centre distance of bull gear and crank pin
  - increasing the length of arm
  - decreasing the length of the slot in the slotted lever
852. The stroke of a shaping machine is 250 mm. It makes 30 double strokes per minute. The overall average speed of operation is
- 3.75 m/min
  - 5 m/min
  - 7.5 m/min \*
  - 15 m/min
853. The snag grinding is done
- to produce good surface finish and high degree of accuracy
  - to remove considerable amount of metal without regard to accuracy of the finished surface \*
  - to grind exterior cylindrical surfaces
  - any of the above
854. The example of snag grinding is
- trimming the surface left by sprues and risers on castings
  - grinding the parting line left on castings
  - removing flash on forgings
  - all of these \*
855. The method of grinding used to produce a straight or tapered surface on a workpiece, is
- internal cylindrical grinding
  - form grinding
  - external cylindrical grinding \*
  - surface grinding
856. The method of grinding used to produce internal cylindrical holes and tapers, is
- internal cylindrical grinding \*
  - form grinding
  - external cylindrical grinding
  - surface grinding
857. Surface grinding is done to produce
- tapered surface
  - flat surface \*
  - internal cylindrical holes
  - all of these
858. The form grinding is used to grind gear teeth, splined shafts and holes.
- Correct \*
  - Incorrect
859. In transverse grinding
- the work is reciprocated as the wheel feeds to produce cylinders longer than the width of wheel face \*
  - the work rotates in a fixed position as the wheel feeds to produce cylinders shorter than the width of wheel face
  - the work is reciprocated as the wheel feeds to produce cylinders shorter than the width of wheel face
  - the work rotates in a fixed position as the wheel feeds to produce cylinders longer than the width of wheel face
860. In plunge grinding
- the work is reciprocated as the wheel feeds to produce cylinders longer than the width of wheel face
  - the work rotates in a fixed position as the wheel feeds to produce cylinders equal to or shorter than the width of wheel face \*
  - the work is reciprocated as the wheel feeds to produce cylinders short than the width of wheel face
  - the work rotates in a fixed position as the wheel feed to produce cylinders longer than the width of wheel face
861. The plunge grinding requires very ..... speed.
- high
  - low \*
862. The work or surface speed for cylindrical grinding varies from
- 5 to 10 m/min
  - 10 to 20 m/min
  - 20 to 30 m/min \*
  - 40 to 60 m/min
863. Thread grinding requires work speed from
- 1 to 3 m/min \*
  - 5 to 10 m/min
  - 10 to 14 m/min
  - 14 to 20 m/min
864. The grinding wheel speed (surface speed in m/min) usually varies from
- 500 to 1000
  - 1000 to 1500
  - 1500 to 2000 \*
  - 2000 to 2500
865. In centreless grinders, the regulating wheel is inclined at
- $0^\circ$  to  $8^\circ$  \*
  - $9^\circ$  to  $15^\circ$
  - $16^\circ$  to  $20^\circ$
  - $21^\circ$  to  $25^\circ$
866. In centreless grinders, the maximum angular adjustment of the regulating wheel is
- $5^\circ$
  - $10^\circ$  \*
  - $15^\circ$
  - $20^\circ$
867. The actual feed in centreless grinders is given by
- $\pi d$
  - $\pi d n$
  - $\pi d n \sin \alpha$  \*
  - $\pi d n \cos \alpha$
- where  $d$  = Dia. of regulating wheel  
 $n$  = Revolutions per minute, and  
 $\alpha$  = Angle of inclination of wheel
868. In centreless grinding, work place centre will be
- above the line joining the two wheel centres \*
  - below the line joining the two wheel centres
  - on the line joining the two wheel centres
  - at the intersection of the line joining the wheel centres with the work place plane
869. Which of the following parameters influence the axial feed rate in centreless grinding ?
- Regulating wheel diameter
  - speed of the regulating wheel
  - angle between the axes of grinding and regulating wheels
  - all of the above \*



870. The grinding of long, slender shafts or bars is usually done by
- infeed grinding
  - through feed grinding \*
  - endfeed grinding
  - any one of these
871. The infeed grinding is used to
- produce tapers
  - grind shoulders and formed surfaces \*
  - grind long, slender shafts or bars
  - all of these
872. The method of centreless grinding used to produce taper is
- infeed grinding
  - through feed grinding
  - endfeed grinding \*
  - any one of these
873. The infeed grinding is similar to plunge grinding
- Yes \*
  - No
874. Which of the following statement is correct in regard to centreless grinding ?
- The workpiece is supported throughout its entire length as grinding takes place.
  - It is continuous process and adopted for production work.
  - It requires no holding device for the work
  - all of the above \*
875. In centreless grinding, the surface speed of regulating wheel is
- 5 to 15 m/min
  - 15 to 60 m/min \*
  - 60 to 90 m/min
  - 90 to 120 m/min
876. In grinding irregular, curved, tapered convex and concave surfaces, the grinder used is
- cylindrical grinder
  - internal grinder
  - surface grinder \*
  - tool and cutter grinder
877. The size of abrasive grain required in a grinding wheel depends upon the
- amount of material to be removed
  - hardness of material being ground \*
  - finish desired
  - all of these
878. In order to grind soft material
- coarse grained grinding wheel is used \*
  - fine grained grinding wheel is used
  - medium grained grinding wheel is used
  - any one of these
879. Soft material can not be economically ground due to
- high temperature involved
  - frequent wheel clogging \*
  - rapid wheel wear
  - low work piece stiffness
880. A fine grained grinding wheel is used to grind
- hard and brittle materials \*
  - soft and ductile material
  - hard and ductile materials
  - soft and brittle materials
881. A coarse grained grinding wheel is used to grind
- hard and brittle materials
  - soft and ductile materials \*
  - hard and ductile materials
  - soft and brittle materials
882. The grind brittle materials, a coarse grained grinding wheel is used
- Agree
  - Disagree \*
883. For fast removal of materials during grinding, a ..... grinding wheel is used
- coarse grained \*
  - fine grained
  - medium grained
884. The hardness of a grinding wheel is specified by
- Brinell hardness number
  - Rockwell hardness number
  - Vickers pyramid number
  - letter of alphabet \*
885. The grade of grinding wheel depends upon
- hardness of the material being ground
  - speed of wheel and work
  - condition of grinding machine
  - all of these \*
886. The soft grade grinding wheels are denoted by the letters
- A to H \*
  - I to P
  - Q to Z
  - A to P
887. When the grinding wheel is marked by the letters from I to P, it indicates that the grinding wheel is of hard grade.
- True
  - False \*
888. The hard grade grinding wheels are denoted by the letters
- A to H
  - I to P
  - Q to Z \*
  - A to P
889. A ..... grinding wheels is used to grind soft materials.
- coarse grained \*
  - medium grained
  - fine grained
890. A fine grained grinding wheel is used to grind hard materials.
- Correct \*
  - Incorrect

891. Which of the following statement is correct ?
- The soft grade grinding wheels are used for grinding soft materials.
  - The soft grade grinding wheels are used for grinding hard materials.\*
  - The hard grade grinding wheels are used for grinding hard materials.
  - The hard grade grinding wheels are used for grinding soft materials.
892. Which of the following statement is wrong ?
- The dry condition is used to grind soft material.\*
  - The dry condition is used to grind hard material.
  - The wet condition is used to grind hard material.
  - The wet condition is used to grind soft material
893. A grinding wheel is said to be of ..... if it holds the abrasive grains more securely.
- soft grade
  - medium grade
  - hard grade \*
894. A grinding wheel is said to be of ..... if the abrasive grains can be easily dislodged.
- soft grade \*
  - medium grade
  - hard grade
895. The structure of a grinding wheel depends upon
- hardness of the material being ground
  - nature of the grinding operation
  - finish required
  - all of these \*
896. An open structure of a grinding wheel is used for
- soft materials
  - tough materials
  - ductile materials
  - all of these \*
897. A dense structure of a grinding wheel is used for
- hard materials
  - brittle materials
  - finishing cuts
  - all of these \*
898. An open structure of a grinding wheel is denoted by the number 1 to 8.
- Right
  - Wrong \*
899. A dense structure of a grinding wheel is denoted by the number 9 to 15 or higher
- Yes
  - No \*
900. The abrasive recommended for grinding materials of high tensile strength is
- silicon carbide
  - aluminium oxide \*
  - sand stone
  - diamond
901. The abrasive recommended for grinding materials of low tensile strength is
- silicon carbide \*
  - aluminium oxide
  - sand stone
  - diamond
902. The silicon carbide abrasive is chiefly used for grinding
- cemented carbide
  - ceramic
  - cast iron
  - all of these \*
903. The aluminium oxide abrasive is chiefly used for grinding
- high speed steel
  - carbon steel
  - cast iron
  - all of these \*
904. Which of the following statement is correct regarding grinding of high carbon steel ?
- Grinding at high speed results in the reduction of chip thickness and cutting forces per grit.
  - Aluminium oxide wheels are employed
  - The grinding wheel has to be of open structure
  - all of the above \*
905. A grinding wheel becomes glazed (i.e. cutting edge takes a glass-like appearance) due to
- wear to bond
  - breaking of abrasive grains
  - wear of abrasive grains \*
  - cracks on grinding wheel
906. Glazing in grinding wheels ..... cutting capacity.
- has no effect on
  - increase
  - decrease \*
907. Glazing in grinding wheels takes place when the
- wheel is too hard or wheel revolves at a very high speed \*
  - wheel is too soft or wheel revolves at a very slow speed.
  - wheel is too hard and wheel revolves at very slow speed.
  - wheel is too soft and wheel revolves at a very high speed
908. Glazing in grinding wheel can be decreased by
- using a harder wheel or by increasing the wheel speed
  - using a softer wheel or by decreasing the wheel speed \*
  - using a harder wheel or by decreasing the wheel speed
  - using a softer wheel or by increasing the wheel speed
909. The process of improving the cutting action of the grinding wheel is called
- truing
  - dressing \*
  - facing
  - clearing
910. The process of changing the shape of grinding wheel as it becomes worn due to breaking away of the abrasive and bond, is called
- truing \*
  - dressing
  - facing
  - clearing
911. The dressing and truing of grinding wheel are done with the same tools but not for the same purpose
- Agree \*
  - Disagree

912. Crack in grinding wheel is developed due to  
 a. high temperature developed at the contact of the wheel face and work  
 b. grinding hard work  
 c. low speed of wheel  
 d. high speed of wheel \*
913. Grinding wheels should be tested for balance  
 a. only at the time of manufacture  
 b. before starting the grinding operation  
 c. at the end of grinding operation  
 d. occasionally \*
914. The tool life in case of a grinding wheel is the time  
 a. between two successive regrinds of the wheel  
 b. taken for the wheel to be balanced  
 c. taken between two successive wheel dressings \*  
 d. taken for a wear of 1 mm on its diameter
915. The grinding operation is a  
 a. shaping operation  
 b. forming operation  
 c. surface finishing operation \*  
 d. dressing operation
916. In lapping operation, the amount of metal removed is  
 a. 0.005 to 0.01 mm \*      b. 0.01 to 0.1 mm  
 c. 0.05 to 0.1 mm      d. 0.5 to 1 mm
917. In order to obtain a surface finish in the range of  $0.75 \mu\text{m}$  to  $1.25 \mu\text{m}$ , the operation used is called  
 a. grinding \*      b. lapping  
 c. honing      d. buffing
918. Buffing wheels are made of  
 a. softer metals      b. cotton fabric \*  
 c. honing      d. buffing
919. In a plain milling machine, the table can be moved  
 a. longitudinally      b. crosswise  
 c. vertically      d. all of these \*
920. In a universal milling machine, the table can be swiveled horizontally and can be fed at an angle to the milling machine spindle  
 a. True \*      b. False
921. The plain milling machine is more rigid and heavier in construction than a universal milling machine of the same size.  
 a. Correct \*      b. Incorrect
922. In which of the following milling machine, the table can be tilted in a vertical plane by providing a swivel arrangement at the knee ?  
 a. Universal milling machine  
 b. Plain milling machine  
 c. Omniversal milling machine \*  
 d. Hand milling machine
923. Internal or external threads of different pitches can be produced by  
 a. pantograph milling machine  
 b. profiling machine  
 c. planetary milling machine \*  
 d. plano-miller
924. Which of the following operations is carried out at a minimum cutting velocity if the machines are equally rigid and the tool work materials are the same ?  
 a. Turning      b. Grinding  
 c. Boring      d. Milling \*
925. The cutting tool in a milling machine is mounted on  
 a. spindle      b. arbor \*  
 c. column      d. knee
926. In a plain milling cutter, the chip space between the back of one tooth and the face of the next tooth is called  
 a. face      b. fillet  
 c. gash \*      d. land
927. In a plain milling cutter, the portion of the gash adjacent to the cutting edge on which the chip impinges is called  
 a. face \*      b. fillet  
 c. land      d. lead
928. A set of eight form relieved milling cutters for each module is provided to enable cutting of gears of different  
 a. materials      b. types of gears  
 c. number of teeth \*      d. width of gears
929. The process of removing metal by a cutter which is rotated against the direction of travel of workpiece, is called  
 a. up milling \*      b. down milling  
 c. face milling      d. end milling
930. The process of removing metal by a cutter which is rotated in the same direction of travel of workpiece, is called  
 a. up milling      b. down milling \*  
 c. face milling      d. end milling
931. In up milling, the thickness of chip is  
 a. minimum at the beginning of the cut and maximum at the end of the cut \*  
 b. maximum at the beginning of the cut and minimum at the end of the cut  
 c. uniform throughout the cut  
 d. none of these
932. The cutting force in up milling ..... per tooth movement of the cutter  
 a. is zero  
 b. is maximum  
 c. decreases from maximum to zero  
 d. increases from zero to maximum \*

933. The cutting force in down milling is maximum when the tooth begins its cut and reduces to minimum when the tooth leaves the work.  
a. Right \*                                b. Wrong
934. In down milling, the thickness of chip is  
a. minimum at the beginning of the cut and maximum at the end of the cut  
b. maximum at the beginning of the cut and minimum at the end of cut \*  
c. uniform throughout the cut  
d. none of these
935. The operation of machining several surfaces of a workpiece simultaneously is called  
a. profile milling                        b. gang milling \*  
c. saw milling                            d. helical milling
936. The operation of reproduction of an outline of a template on a workpiece is called face milling.  
a. Yes                                        b. No \*
937. The saw milling is an operation of  
a. producing grooves around the periphery of a cylindrical or conical workpiece  
b. producing narrow slots or grooves on a workpiece\*  
c. reproduction of an outline of a template on a workpiece  
d. machining several surfaces of a workpiece simultaneously
938. The operation of producing grooves around the periphery of a cylindrical or conical workpiece is called  
a. profile milling                        b. gang milling  
c. saw milling                            d. helical milling \*
939. Down milling is also called  
a. conventional milling                b. climb milling \*  
c. end milling                            d. face milling
940. Up milling is chosen while machining because  
a. Agree \*                                b. Disagree
941. Climb milling is chosen while machining because  
a. the chip thickness increase gradually  
b. it enables the cutter to dig and start the cut \*  
c. the specific power consumption is reduced  
d. better surface finish can be obtained
942. Internal gears can be made by  
a. hobbing  
b. shaping with pinion cutter \*  
c. shaping with rack cutter  
d. milling
943. In a milling operation, two side milling cutters are mounted with a desired distance between them so that both sides of a workpiece can be milled simultaneously. This set up is called  
a. gang milling                            b. straddle milling \*  
c. string milling                        d. side milling
944. Which of the following statement is wrong as regard to down milling ?  
a. It can not be used on old machines due to backlash between the feed screw of the table and the nut  
b. The chips are disposed off easily and do not interfere with the cutting.  
c. The surface milled appears to be slightly wavy.\*  
d. The coolant can be poured directly at the cutting zone where the cutting force is maximum
945. Which of the following statement is correct as regard to up milling ?  
a. It can not be used on old machines due to backlash between the feed screw of the table and the nut  
b. The chips are disposed off easily and do not interfere with the cutting.  
c. The surface milled appears to be slightly wavy. \*  
d. The coolant can be poured directly at the cutting zone where the cutting force is maximum
946. Which of the following operations can be performed with milling cutters ?  
a. cutting key ways on shafts  
b. cutting external screw threads  
c. cutting teeth of spur gears  
d. all of these \*
947. In ..... operation, the chip thickness is minimum at the beginning of the cut and it reaches to the maximum when the tooth leaves the work.  
a. conventional milling \*                b. climb milling  
c. face milling                            d. end milling
948. In conventional milling, the cutting force tends to lift the work.  
a. True \*                                        b. False
949. In ..... operation, the cutting force is maximum when the tooth begins its cut and reduces it to minimum when the tooth leaves the work.  
a. up milling                                b. down milling \*  
c. face milling                            d. end milling
950. Any number of equal divisions can be obtained on milling machine by  
a. direct indexing                        b. simple indexing \*  
c. compound indexing                d. differential indexing
951. A process of removing metal by pushing or pulling a cutting tool is called  
a. up milling                                b. down milling  
c. forming                                    d. broaching \*
952. A push broach as compared to pull broach  
a. has less number of teeth  
b. is short and stocky  
c. removes less material for each pass of the tool  
d. all of the above \*

953. Holes are machined by push broaches only for sizing  
a. Right \* b. Wrong
954. The height of each tooth of a broach is  
a. same throughout  
b. in progressively decreasing order  
c. in progressively increasing order \*  
d. none of these
955. A broach has  
a. roughing teeth b. semi-finishing teeth  
c. finishing teeth d. all of these \*
956. The broaching operation in which either the work or the tool moves across the other, is known as  
a. pull broaching  
b. push broaching  
c. surface broaching \*  
d. continuous broaching
957. The broaching operation in which the work moves past the stationary tool is called  
a. pull broaching  
b. push broaching  
c. surface broaching  
d. continuous broaching \*
958. Broaching is applied for machining  
a. internal and external surfaces  
b. round or irregular shaped holes  
c. external flat and contoured surfaces  
d. all of these \*
959. The rear teeth of a broach  
a. perform burnishing operation  
b. remove minimum metal  
c. remove maximum metal \*  
d. remove no metal
960. The advantage of a broaching operation is that  
a. rate of production is very high  
b. high accuracy and high class of surface finish is possible  
c. roughing and finishing cuts are completed in one pass of the tool  
d. all of the above \*
961. A twist drill is specified by  
a. The size of hole it can drill  
b. A number specifying hole size  
c. A letter of alphabet  
d. Any of above \*  
e. None of above.
962. Angle plate is  
a. Used for holding angular jobs in milling machine  
b. Used for cutting angles on jobs on shaper  
c. Cast iron jig used to hold work in a vertical position of layout or machining  
d. Used for measurement of angles.\*
963. Cat head is  
a. Cover head  
b. Projecting head for protection  
c. A sleeve or collar which fits out-of round or irregular shaped work permitting to be supported in a steady rest \*  
d. An artificial cover provided on finished work piece for preventing damage to machined parts  
e. Dead centre.
964. Necking is  
a. Machining a groove around a cylindrical shaft \*  
b. Drilling a hole in a plate  
c. Hole drilled for riveting  
d. Preparation of surface for brazing  
e. Initial spot welding to position jobs.
965. Quill is  
a. A tool used in milling machine to cut T-slots  
b. A holding device used on planers  
c. Cutting a blind key way on an object  
d. A steel tube in the head of some machine tools that encloses the bearings and rotating spindle on which are mounted the cutting tools \*  
e. None of the above.
966. A shim is  
a. A treatment given to a surface to prevent rusting  
b. A dull corner on a shaft  
c. A Thin piece of sheet metal used between mating parts to provide the proper distance \*  
d. A surface on which bearings are fitted  
e. A kind of shrink fit.
967. Spot facing is  
a. Localised machining of a component  
b. Machining of a spot to fit other parts  
c. Machining of spot on the surface of a part to furnish a flat bearing or the head of a bolt or nut \*  
d. A spot prepared on shaper or milling machine  
e. None of the above.
968. Tumbler gears are  
a. Bevel gears of same module  
b. Double helical gears  
c. Gears used in milling machine to connect a dividing head with table movement for helical milling  
d. Gears in lathe used to reverse the direction of rotation of the driven gear \*  
e. Gears in lathe head-stock to reduce the spindle speed.
969. Ezy out is  
a. A taper reamer  
b. A drill having two diameters  
c. A tool for making round objects  
d. A tool for removing broken bolts and studs from a hole \*  
e. An instrument for measurement of out of roundness of objects.



986. A mandrel is
- A slightly tapered hardened steel shaft that supports works which cannot be supported otherwise
  - A tapered gauge used for inspection of tapered holes \*
  - Auxiliary chuck used on lathe for holding small loads
  - Is used in lathe work to hold castings
  - None of the above.
987. Music wire
- Is fine wire used in musical instruments
  - Is a carbon steel wire used to manufacture springs\*
  - Is a resistance wire used in instruments
  - Is a standard wire for gauge determination
  - None of the above.
988. In a centre lathe gear box for changing spindle speeds the provision for speeds is made in
- Arithmetical progression
  - Geometrical progression \*
  - Square progression
  - Cubical progression
  - Random members.
989. In a lathe gear box if first four consecutive speed are 19, 30, 47, 74 rpm, the next speed would be
- 93 rpm
  - 104 rpm
  - 101 rpm
  - 111 rpm
  - 116 rpm.\*
990. In a drilling machine having six spindle speeds if first five speeds are 458, 605, 800, 1055 and 1390 rpm, the next higher speed would be
- 1440 rpm
  - 1500 rpm
  - 1630 rpm
  - 1760 rpm
  - 1830 rpm.\*
991. The relation for cutting tool life is given as  $VT^n = C$   
where V is cutting speed, T is corresponding life n and c are constants depending on cutting conditions. The numerical value of n for roughing cut as compared to that for light cuts in mild steel would be
- More \*
  - Less
  - Same
  - Does not depend on type of cut
  - Depends on other factors.
992. The length of a hacksaw blade is measured from
- Extreme one to extreme end
  - Centre of hole at one end to the centre of hole at the other end \*
  - The formula  $L = 16 \times \text{width}$
  - None of these.
993. The width of slot cut by a hack-saw blade is
- Equal to the width of blade
  - Less than the width of blade
  - Slightly more than the width of blade \*
  - None of these.
994. Hack-saw blades having the number of teeth as given below are available. Which one would you choose for cutting brass
- 14 teeth per inch
  - 18 teeth per inch
  - 24 teeth per inch \*
  - 31 teeth per inch
  - 40 teeth per inch.
995. A Hack-saw blade cuts on
- Forward stroke \*
  - Return stroke
  - Both
  - Depends on direction of force
  - Depends on orientation.
996. A thin tube is to be cut by hacksawing. Blades with following TPI are available which blade will be appropriate for the job
- 14 TPI
  - 18 TPI
  - 24 TPI
  - 32 TPI \*
  - 40 TPI.
997. A knee is a part of
- Lathe
  - Shaper
  - Milling machine \*
  - Jig boring machine
  - Broaching machine.
998. Following plates are available for indexing :
- 15 hole-circle
  - 18 hole-circle \*
  - 39 hole-circle
  - 48 hole-circle.
- Which plate would you select while indexing for 9 divisions.
999. A plug gauge is used for measuring
- Taper bores
  - Cylindrical bores \*
  - Spherical holes
  - Screw threads
  - None of the above.
1000. A master gauge is
- Used by masters
  - Used by all mechanics \*
  - A standard gauge for checking accuracy of gauges used on shop floors
  - A gauge used by experienced technician
  - None of the above.
1001. If the rake angle on a HSS lathe tool is 25 degrees the materials being machined is
- Cast iron
  - Mild steel
  - Carbon steel
  - High speed steel
  - Aluminium.\*
1002. Which one of the following materials will have highest cutting speed ?
- Cast iron
  - Tool steel
  - Brass
  - Bronze
  - Aluminium.\*
1003. Which one of the following materials will have lowest cutting speed ?
- Mild steel
  - Aluminium
  - Bass
  - Bronze
  - High carbon steel.\*

1004. Spindle speed in a lathe for turning a 40 cm dia rod at a cutting speed of 30 m/min would be  
 a. 100 rpm                      b. 206 rpm  
 c. 238 rpm \*                    d. 336 rpm  
 e. 468 rpm.
1005. When 50 mm rod is turning at a spindle speed of 200 rpm the cutting speed would be  
 a. 10-12 m/min                b. 12-15 m/min  
 c. 15-20 m/min                d. 20-28 m/min  
 e. 30-35 m/min.\*
1006. While machining a brass casting on a lathe, the type of chuck used is  
 a. Collet chuck                b. Magnetic chuck  
 c. Face plate                  d. Three jaw chuck  
 e. Four jaw chuck.\*
1007. When large number of components are turned and parted off from a bar, the chuck used is  
 a. Three jaw chuck            b. Four jaw chuck  
 c. Face place                  d. Collet chuck \*  
 e. Magnetic chuck.
1008. In a drilling operation  
 a. Torque is equal to the axial force  
 b. Torque is more than the axial force  
 c. Torque is less than the axial force  
 d. Torque is half the axial force \*  
 e. None of the above.
1009. Gear tooth vernier is used to measure  
 a. Gear tooth profile  
 b. Gear tooth thickness  
 c. Pitch line thickness of gear tooth \*  
 d. Module  
 e. Addendum and dedendum.
1010. Cutting speeds for some material are given as  
 a. 20 m/min                    b. 30 m/min  
 c. 40 m/min \*                  d. 80 m/min  
 e. 100 m/min.  
 Which one of the above could be cutting speed for brass
1011. Undercutting is  
 a. An operation of cutting extra wide threads  
 b. An operation of cutting a groove next to a shoulder on a piece of work \*  
 c. Cutting from the base of cutting deep grooves  
 d. An operation of cutting deep grooves  
 e. None of the above.
1012. Kind of tools used to undercut corners on a job that is to be hardened and ground is  
 a. Parting tool                b. Roundnose tool \*  
 c. Vee shaped tool            d. Knurling tool  
 e. Form tool.
1013. In a turret lathe a pre-selector is a device  
 a. That is used to select in the job prior to loading  
 b. That is used to decide the operation to be done on a job prior to a specific operation  
 c. That is used to pre-select the spindle speed for the next operation in progress \*  
 d. Used for feeding bar to chuck  
 e. None of the above.
1014. Brown and sharpe taper is generally used in  
 a. Lathes                        b. Drills  
 c. Shapers                      d. Milling machines \*  
 e. Broaching machines.
1015. Taper generally used in lathes now-a-days is  
 a. Brown and Sharp            b. Morse \*  
 c. Jarno                         d. Parkinson  
 e. None or these.
1016. Two jobs are to be turned for taper by swivelling of cross slide method (Fig.1.3). The ratio of angle of taper in two cases A/B will be  
 a. Same \*                        b. 2  
 c. 1/2                              d. 1/4  
 e. 1/8.

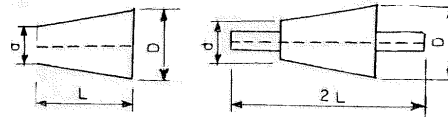


Fig.1.3

1017. Which one of the following methods cannot be used for turning internal tapers ?  
 a. Tail stock offset \*        b. Cross slide  
 c. Compound slide            d. All of the above  
 e. None or the above.
1018. In drilling operation if the drill point is outside the drill axis, the effect on the drilled hole will be  
 a. The hole will become too large \*  
 b. The hole will become elliptical  
 c. The drilled hole will be normal  
 d. The hole will be rough  
 e. The hole will be smooth.
1019. If a drill has different lengths of cutting edges  
 a. The drilled hole will not be circular  
 b. Cutting edge will become blunt rapidly \*  
 c. Cutting edge will be over size  
 d. The drilled hole will be rough  
 e. The drilled hole will be smooth.
1020. If the drill breaks when working on a soft and tough material, the likely cause could be  
 a. Flutes of drill obstructed by chips \*  
 b. Insufficient supply of coolant  
 c. Spindle speed low  
 d. Cutting edge blunt  
 e. None of the above.



1021. If a drill does not cut, the probable cause would be  
 a. Drill blunt \*                      b. Material difficult to drill  
 c. Speed low                              d. Absence of coolant  
 e. None of the above.
1022. Simple indexing using a dividing head of turn ratio 40 for 6 division would be  
 a. 14 holes in 21 hole circle plate  
 b. 6 turns  
 c. 26 holes in 21 hole circle plate  
 d. 6 turns and holes in 21 hole circle plate \*  
 e. 6 turns and 14 holes in 30 hole circle plate.
1023. Simple indexing using a dividing head of 40 turn ratio for 62 divisions would be  
 a. One turn and 6 holes in 21 hole circle plate  
 b. One turn and 20 holes in a 31 hole circle plate  
 c. One turn and 40 holes in a 62 hole circle plate  
 d. Two turns  
 e. 40 holes in 62 hole circle plate.\*
1024. Indexing for 107 divisions can be done by  
 a. Simple indexing  
 b. Compound indexing  
 c. Differential indexing \*  
 d. Compound differential indexing  
 e. Angular indexing.
1025. The index plate of a dividing head is geared to the spindle in the ratio  $\frac{\text{turns of spindle}}{\text{turns of plate}} = \frac{2}{1}$  (rotation opposite crank). If the crank is now indexed 3 complete turns +15 holes in a 20 hole circle, through what angle has the spindle been rotated ?  
 a.  $16^{\circ} 40'$                               b.  $49^{\circ}$   
 c.  $50^{\circ} 40'$                               d.  $33^{\circ} 20'$  \*  
 e.  $2^{\circ} 20'$ .
1026. In most high speed milling cutters, positive radial rake angle is  
 a.  $10 - 15^{\circ}$  \*                              b.  $15 - 25^{\circ}$   
 c.  $25 - 35^{\circ}$                               d.  $5 - 10^{\circ}$   
 e. Less than  $50^{\circ}$ .
1027. The included angle of a lathe centre is generally  
 a.  $15^{\circ}$                                               b.  $22\frac{1}{2}^{\circ}$   
 c.  $30^{\circ}$                                               d.  $45^{\circ}$   
 e.  $60^{\circ}$ .\*
1028. For mild steel work piece using carbide tool, the temperature at which maximum materials is removed is  
 a. Below room temperature  
 b. Near zero deg. centigrade  
 c.  $100^{\circ}\text{C}$   
 d.  $200^{\circ}\text{C}$   
 e.  $275^{\circ}\text{C}$ .\*
1029. A standard ground drill for use on mild steel has a point angle of  
 a.  $30^{\circ}$                                               b.  $60^{\circ}$   
 c.  $80^{\circ}$                                               d.  $118^{\circ}$  \*  
 e.  $138^{\circ}$ .
1030. In centreless grinding, work piece is clamped in  
 a. Bed                                              b. Vice  
 c. Chuck                                              d. Collet  
 e. Not clamped.\*
1031. In centreless grinding the work piece advances by  
 a. Push given by operator  
 b. Hydraulic force  
 c. Force exerted by grinding wheel  
 d. Force exerted by regulating wheel \*  
 e. Remains stationary.
1032. In a 48 A 100 - H - 8 - S - BE grinding wheel the type of bond used is  
 a. Vitrified                                              b. Silicate \*  
 c. Resinoid                                              d. Rubber  
 e. Shellac.
1033. To clean a hand file  
 a. It is dipped in water  
 b. It is dipped in dilute acid  
 c. It is rubbed on stone  
 d. File card is used \*  
 e. It is rubbed on wood.
1034. Size of a shaper is generally specified by  
 a. The area of machined surface per hour  
 b. Maximum travel of cutting tool \*  
 c. Length, breadth and height of machine  
 d. Quick return ratio  
 e. Weight of the machine.
1035. If N is number of strokes per minute, L is stroke length in mm, C is cutting ratio (cutting time/total time) the cutting speed of shaper in metres/min is given by  
 a.  $\frac{NL}{1000C}$  \*                                              b.  $\frac{NLC}{1000}$   
 c.  $\frac{1000L}{NC}$                                               d.  $\frac{1000LC}{N}$   
 e.  $\frac{N^2L}{1000C}$ .
1036. In climb milling  
 a. Work moves in same direction as rotation of the cutter \*  
 b. Work moves in opposite direction as rotation of the cutter  
 c. Tool climbs on the work piece for cutting operation  
 d. Work is fed to cutter in lateral direction  
 e. Cutting takes place in two planes simultaneously.

1037. Standard milling arbour size is
- 1 inch
  - $1\frac{1}{4}$  inch
  - 27 mm
  - 32 mm
  - All above.\*
1038. In a 32A 49 - H 8V BE grinding wheel the grit size is represented by
- 32
  - 46 \*
  - 8
  - BE
  - H.
1039. Standard taper generally used on milling machine spindles is
- Morse taper
  - Chapman taper
  - Brown and sharpe taper \*
  - Jarno and Reed taper
  - Seller's taper.
1040. Which one of the following methods can be used for turning external tapers only ?
- Compound rest
  - Tail stock offset \*
  - Taper attachment
  - Form tool
  - Reamer.
1041. A 12 mm drilling machine means
- It can drill holes in 12 mm thick plates
  - It can drill holes maximum 12 mm in diameter \*
  - It can be used for drilling holes having cross-sectional area of 12 sq mm
  - All of the above
  - None of the above.
1042. If following operations are to be performed on a job, which one would be performed first
- Drilling \*
  - Boring
  - Counter sinking
  - Tapping
  - Spot facing.
1043. Spiral flutes are provided on drill bits to
- Help from the cutting edge of the drill point
  - Curl the chip tightly for easier removal
  - Provide passage for coolant supply
  - All of the above \*
  - None of the above.
1044. Point angle of drill is usually more while drilling
- Mild steel
  - Marble
  - Slate
  - Soft cast iron
  - Hard alloys.\*
1045. Sintered tungsten carbides can be machined by
- Conventional processes
  - Grinding only
  - Diamond tools only
  - Electro machining process \*
  - Explosive forming.
1046. Chisels used for metal cutting are
- Hardened
  - Annealed
  - Hardened and tempered
  - Annealed, hardened and tempered \*
  - None of the above.
1047. Chisels for metal cutting are
- Hardened all over \*
  - Hardened in the middle
  - Hardened at cutting edge
  - Hardened at random
  - Never hardened.
1048. A diamond point chisel is used for
- Flat surfaces
  - Round surfaces
  - Convex surfaces
  - V-shaped grooves \*
  - Spherical surfaces.
1049. A hot chisel is one which is
- Red hot
  - Used to cut red hot materials \*
  - Used to cut cold materials
  - None of these.
1050. For cutting mild steel the cutting angle of a chisel should be
- 55°
  - 60°
  - 70° \*
  - 75°
  - 35°.
1051. The cemented carbide tools are generally poor in
- Compression
  - Tension
  - Shear \*
  - Torsion
  - None of the above.
1052. In orthogonal cutting of metals the cutting edge is
- Perpendicular to the direction of tool travel \*
  - Perpendicular to the work piece
  - Perpendicular to the shear plane
  - Perpendicular to the axis of cutting tool
  - None of the above.
1053. The coefficient of friction between chip and tool is the variable. It can be reduced by
- Reducing the width of tool
  - Reducing the depth of cut
  - Reducing the effective rake angle \*
  - None of the above.
1054. The binding material used in cemented carbide tools is
- Nickel
  - Cobalt \*
  - Chromium
  - Carbon
  - Sulphur.
1055. In a machining operation on free cutting mild steel the cutting speed is mentioned as 70 m/min. What should be material of cutting tool.
- Carbon steel
  - High speed steel
  - Carbide \*
  - Diamond
  - Wood.

1056. In metal cutting operations shear angle is defined as the angle
- Made by the plane of shear with the direction of tool travel \*
  - Made by the shear plane with the tool axis
  - Made by shear plane with the central plane of work piece
  - None of the above.
1057. Discontinuous type chips are generally produced in
- Mild steel
  - Cast iron \*
  - Aluminium
  - Alloy steels
  - Duralumin.
1058. In metal cutting operations continuous chips are produced while machining
- Brittle materials
  - Ductile materials \*
  - Hard materials
  - Soft materials
  - None of the above.
1059. The coolant generally used while machining with carbide tools is
- Kerosene
  - Water
  - Compressed air
  - Soluble oil \*
  - Graphite.
1060. While machining cast iron generally cutting fluid is not required because
- Cast iron surface is generally rough
  - The cast iron jobs revolves at low speeds
  - Cast iron contains graphite which does not allow temperatures to rise \*
  - Cast iron contains carbon which cools the job
  - None of the above.
1061. If for a 1 : 5 taper the taper angle is  $11^{\circ} 25'$  the angle for 1 : 20 taper will be
- $11^{\circ} 25'$
  - $5^{\circ} 43'$
  - $2^{\circ} 52'$  \*
  - $22^{\circ} 50'$
  - $25^{\circ} 0'$ .
1062. The average cutting speed for machining mild steel by a high speed steel tool is
- 10 m/min
  - 20 m/min
  - 30 m/min \*
  - 40 m/min
  - 50 m/min.
1063. The function of a chip breaker in a cutting tool is
- To provide smooth path for long chips
  - To get long curled chips
  - To break the chips into short segments \*
  - To remove chips from bed
  - None of the above.
1064. The function of a coolant in a metal cutting operation is
- To cool the job
  - To cool the tool
  - To reduce the friction at cutting point \*
  - To obtain bright shining surface on the job
  - None of the above.
1065. A 250 mm diameter is turned at a cutting speed of 20 m/min, feed 0.5 mm per revolution of spindle at a spindle speed of 25 R.P.M. Now if the diameter of work-piece is doubled and spindle speed is also doubled, the time taken to turn the job will be
- Four times the original time
  - Double the original time
  - No change in turning time \*
  - One fourth the original time.
1066. The cutting tool is
- Goose neck tool
  - Threading tool
  - Parting tool \*
  - Drilling tool
  - Boring tool.
1067. A lathe centre is being ground up by a 75 mm diameter grinding wheel fixed to a tool post grinder on the compound side. If the centre of the wheel is set 6 mm below the axis of the lathe centre, and the compound slide fed at  $30^{\circ}$ . The angle to which centre will be ground will be
- $60^{\circ}$
  - Less than  $60^{\circ}$  \*
  - More than  $60^{\circ}$
  - $55^{\circ}$
  - $65^{\circ}$ .
1068. In theory of metal cutting the shear plane angle is the angle between
- Shear plane and job surface \*
  - Shear plane and vertical plane
  - Shear plane and horizontal plane
  - Shear plane and tool surface
  - Shear plane and tool axis.
1069. In tool signature, the nose radius is indicated
- In the first position
  - In the last position \*
  - In the middle
  - Second from end
  - Second position.
1070. Relief angle on HSS tools usually vary from
- 3 to  $10^{\circ}$  \*
  - 11 to  $15^{\circ}$
  - 16 to  $150^{\circ}$
  - 22 to  $27^{\circ}$
  - 28 to  $30^{\circ}$
1071. Continuous chips may be formed while machining
- Brittle material
  - Hard material
  - Tough material
  - Ductile material \*
  - Non-ferrous material.
1072. Discontinuous or segmental chips are formed while machining
- Cast iron \*
  - Mild steel
  - Carbon steel
  - Alloy steel
  - Brass.
1073. The tool signature comprises
- 5 elements
  - 6 elements
  - 7 elements \*
  - 8 elements
  - 9 elements.

1074. Chips with built up edge are produced while machining
- Ductile material \*
  - Brittle material
  - Cast materials
  - Hard materials
  - Non-ferrous materials.
1075. Which one of the following is not a part of micrometer
- Thimble
  - Spindle
  - Sleeve
  - Beam \*
  - Anvil.
1076. An examiner has given the following as parts of drill bit. Find which one is not correct
- Dead centre
  - Shank
  - Point
  - Cutting edge
  - Eye.\*
1077. Taper shank on drills is provided for
- Drilling taper holes
  - Quick intersection in spindle \*
  - Use on tapered surfaces
  - None of these.
1078. For a specified cutting speed a job of diameter D must rotate at N rpm while turning in a lathe. What will be the rpm of a drill for drilling a hole of diameter D in the same material if the same cutting speed is to be maintained
- N \*
  - 2N
  - N/2
  - 4N
  - 8N.
1079. For drills having diameter upto 12.7 mm
- Parallel shank is provided \*
  - Tapered shank is provided
  - Shank may be either of (a) or (b).
1080. The angular clearance provided on dies is usually
- $\frac{1}{2}^{\circ}$  to  $1^{\circ}$  \*
  - $3^{\circ}$  to  $5^{\circ}$
  - $5^{\circ}$  to  $7^{\circ}$
  - $7^{\circ}$  to  $9^{\circ}$
  - $10^{\circ}$  to  $15^{\circ}$ .
1081. With HSS tools the maximum safe operating temperature is of the order of
- 200°C
  - 340°C
  - 440°C
  - 540°C \*
  - 640°C.
1082. Drills are usually made of
- Carbon steel
  - High carbon steel
  - High speed steel \*
  - Carbides
  - Diamonds.
1083. Out of the following tools which one is expected to have highest carbon percentage
- Ordinary file \*
  - Pliers
  - Wrenches
  - Crowbar
  - Circular saw.
1084. Which one does not fit with the rest in the following:
- Hot chisel
  - Hot punch
  - Flatter
  - Hammer
  - Reamer.\*
1085. Which one does not fit with rest in the following ?
- Reamer
  - Pipe cutter \*
  - Drill
  - Tap
  - Jaw chuck.
1086. Which one does not fit with the rest in the following?
- Scale
  - Micrometer
  - Pitch gauge
  - Twist drill \*
  - Vernier caliper.
1087. Accuracy is
- The repeatability of a measuring process
  - Error of judgement in recording an observation
  - The ability of an instrument to reproduce same reading under identical situations
  - Agreement of the result of a measurement with the true value of the measured quantity \*
  - None of the above.
1088. Which one of the following is supposed to be least accurate ?
- Air gauge
  - Surface plate
  - Optical projector
  - Vernier micrometer
  - Steel scale.\*
1089. Precision is
- The repeatability of a measurement process \*
  - Agreement of the result of a measurement with the true value of the measured quantity
  - The ability of a measuring device to detect small differences in a quantity being measured
  - The ability of an instrument to reproduce same reading under identical conditions
  - Error of judgement in reading on observation.
1090. Which one of the following measuring instruments is supposed to be most accurate ?
- Steel scale
  - Micrometer
  - Vernier caliper
  - Vernier dial gauge
  - Optical projector.\*
1091. Large size bolt heads are made by
- Hammering
  - Casting
  - Swaging
  - Upset-forging \*
  - Roll forging.
1092. A feeder gauge is used to check
- Screw pitch
  - Diameter of round objects
  - Surface roughness
  - Thickness of a clearance \*
  - Unsymmetrical shape.

1093. Knurling is an operation
- Of cutting smooth collars
  - Of under cutting
  - Done prior to screw cutting
  - Of generally roughing the surface for hand grip \*
  - Done without use of coolant.
1094. In a sine bar the standard length is measured from
- Edge to edge
  - Between inner circumference of two buttons
  - Between outer circumference of two buttons
  - Between the centers of two buttons \*
  - Any of the above.
1095. If the fringe pattern on an optical flat is as shown in Fig.1.4. The surface under flat would be
- Perfectly flat
  - Cylindrical
  - Spherical
  - Ridge or valley
  - Convex.\*

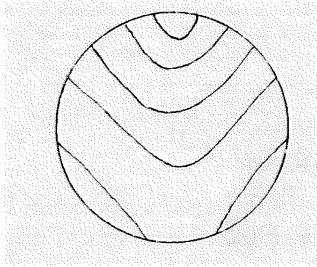


Fig.1.4

1096. A micron is
- 1 mm
  - 0.1 mm
  - 0.01 mm
  - 0.001 mm \*
  - 0.0001 mm.
1097. A hermaphrodite caliper is
- Outside caliper
  - Inside caliper \*
  - Divider
  - Has parallel legs
  - Has one leg bent and other straight with a sharp point.
1098. Which one of the following is an angle measuring device ?
- Trammel
  - Hermaphrodite caliper
  - Divider
  - Angle iron
  - Sine bar.\*
1099. Which one of the following is not a angle measuring device ?
- Bevel protector
  - Signal bar
  - Combination square
  - Angle iron \*
  - Angle gauge blocks.
1100. Optical flats are made of
- Steel
  - Brass
  - Plastic
  - Bakelite
  - Quartz.\*
1101. During continuous chip formation the maximum heat is taken away by
- Tool
  - Chip
  - Coolant
  - Work piece
  - Depends on velocity of cutting.\*
1102. In centreless grinding the regulating wheel is inclined at an angle
- 1 - 8° \*
  - 9 - 15°
  - 15 - 18°
  - 12 - 24°
  - 25 - 35°.
1103. The surface speed of regulating wheel in case of centreless grinding is
- 15 - 75 M/min \*
  - 100 - 500 M/min
  - 500 - 800 M/min
  - 1000 - 1500 M/min
  - 1500 - 1800 M/min.
1104. The surface speed of grinding wheel in case of centreless grinding is
- 15 - 75 M/min
  - 100 - 500 M/min
  - 500 - 800 M/min
  - 1000 - 1500 M/min
  - 1500 - 1800 M/min.\*
1105. Shear angle varies with
- Cutting speed
  - Feed
  - Depth of cut
  - Material of tool
  - Work piece materials and tool geometry.\*
1106. In a shrink rule the graduations are
- Slightly longer than the regular graduations \*
  - Same as regular graduations
  - Slightly shorter than the regular graduations.
1107. Which one of the following is not included in the combinations set ?
- A rule
  - Square
  - A centre head
  - A protector
  - Short rule.\*
1108. Which one of the following is known as trammel ?
- A pair of steel legs joined by a screw and nut
  - A steel bar and two sliding legs which can be adjusted \*
  - A divider with a spring
  - None of the above.
1109. Inside and outside diameters of a thin tube are to be measured. Only one of the following tools is to be selected. Which one would you choose ?
- Inside caliper
  - Outside caliper
  - Trammel
  - Odd-leg caliper
  - Vernier caliper.\*
1110. Which is not a part of shaper ?
- Ram
  - Tool head
  - Table
  - Cross slide \*.
1111. When a thin job is to be machined on a shaper, in order to prevent warping, which one of the following steps should be taken first ?
- Light cut \*
  - Heavy cut
  - Single heavy cut
  - Any of the above
  - None of the above.

1112. In a power hacksaw machine blade the number of teeth per inch are generally
- 4 - 6 \*
  - 10 - 12
  - 12 - 20
  - 20 - 24
  - 24 - 32.
1113. High carbon steels contain carbon
- Between 0.05 to 0.6 percent
  - Between 0.6 to 1.3 percent \*
  - Between 1.3 to 1.7 percent
  - More than 1.7 percent.
1114. Choose the incorrect statement  
Good machinability results in
- Low components cost \*
  - Moderate cutting forces
  - Smaller chips
  - All of the above.
1115. Cutting speed in turning operations is maximum in case of
- Cast iron
  - Mild steel
  - Brass
  - Bronze
  - Aluminium.\*
1116. Coolant used while turning cast iron is
- Lard oil
  - Soluble oil
  - Kerosene
  - Soda water
  - None of the above.\*
1117. Cutting speed in turning operation for aluminium is
- 15 m/min
  - 30 m/min
  - 200 m/min \*
  - 400 m/min
  - 1000 m/min.
1118. An accurate lathe in India is identified as
- Mark I
  - Accurate I
  - Grade I \*
  - Precision I
  - Agmark I.
1119. In gang milling
- Work is fed into the rotation of the cutter
  - Work moves in the same direction as the rotation of the cutter
  - Work moves in the opposite direction as the rotating of the cutter
  - More than one cutter is simultaneously used \*
  - A cutter generates two or more plain surface simultaneously.
1120. The maximum peripheral speed of a grinding wheel is limited by
- The work material
  - The diameter of the wheel
  - The drive limitations
  - The size of the work piece
  - The kind of bond used in the wheel.\*
1121. Which bond is commonly used in grinding wheel
- Vitrified bond \*
  - Silicate bond
  - Shellac bond
  - Resinoid bond
  - Rubber bond.

1122. A sine bar is used to measure
- Surface roughness
  - Gear profiles
  - Internal tapers
  - External tapers.\*
  - All of the above.
1123. Profile of a gear tooth is to be checked. Which one of the following device would you choose ?
- Optical pyrometer
  - Telescopic gauge
  - Sine bar
  - Telescopic gauge
  - Optical projector.\*
1124. If the interference bands with optical flat are as shown in figure 1.5, the surface would be
- Convex \*
  - Concave
  - Ridge
  - Progressively convex
  - Uneven .

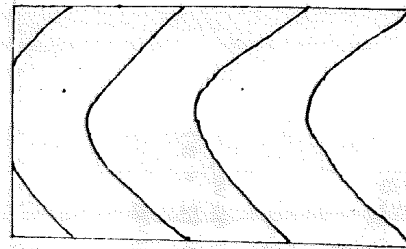


Fig.1.5

1125. If the correctness of profile of a thread is to be checked which instrument would you choose ?
- Bench micrometer
  - Screw pitch gauge
  - Sine bar
  - Telescopic gauge
  - Optical projector.\*
1126. Which of the following process cannot be carried out on lathe machine ?
- Notching
  - Riveting
  - Punching
  - Blanking
  - All of the above.\*
1127. The surface of a slip gauge is produced by
- Milling
  - Grinding
  - Lapping \*
  - Burnishing
  - Any of the above.
1128. The surface accuracy of slip gauges is of the order of
- 0.00002  $\mu$  m
  - 0.0002  $\mu$  m
  - 0.002  $\mu$  m
  - 0.02  $\mu$  m \*
  - 0.2  $\mu$  m.
1129. The smallest thickness that can be measured by a slip gauge is
- 0.001 mm
  - 0.01 mm
  - 0.1 mm
  - 1 mm
  - 1.001 mm.\*
1130. Which of the following does not represent the number of slip gauges in a metric set ?
- 45
  - 65 \*
  - 88
  - 103
  - 110.

1131. Which of the following material is cut at the highest cutting speed ?
- Copper
  - Brass
  - Alloy steel \*
  - High carbon steel
  - Cast iron.
1132. Burnishing operation is done with the help of
- Abrasives
  - Dielectrics
  - Balls \*
  - Lubricating oils
  - Any of the above.
1133. For cylindrical grinding the peripheral speed will be of the order of
- 18000 m/min
  - 9000 m/min
  - 1800 m/min \*
  - 800 m/min
  - 180 m/min.
1134. A 30 mm diameter is being machined when the chuck is revolving at 100 rpm. The cutting speed is nearly
- 30 metres per minute
  - 40 metres per minute
  - 50 metres per minute
  - 60 metres per minute \*
  - 70 metres per minute.
1135. A work piece of 100 mm diameter is to be machined at a cutting speed of 100 metres per minute. The rpm of the work piece should be
- 100
  - 159
  - 200
  - 318 \*
  - 636.
1136. While using cemented carbide tipped tools on aluminium, the cutting speed could be
- 1000 m/min
  - 300 - 900 m/min \*
  - 100 - 300 m/min
  - 50 - 100 m/min
  - 20 - 50 m/min.
1137. During metal cutting operation on machine tools, the major portion of heat is carried away by
- Chip \*
  - Tool
  - Work piece
  - Chip and tool have identical heat dissipation
  - Chip tool and work piece have identical proportion of heat dissipation.
1138. Gear cutter No. 1 for cutting gears on milling machine is used for
- Racks only
  - 12 to 13 teeth
  - 17 to 20 teeth
  - 55 to 120 teeth
  - 135 to 150 teeth. \*
1139. In case of turning or milling, the surface roughness is expected to be in the range ( $\mu = 0.001 \text{ mm}$ )
- 5 to 15  $\mu$
  - 20 to 50  $\mu$
  - 50 to 100  $\mu$
  - 100 to 250  $\mu$  \*
  - 250 to 500  $\mu$  .
1140. An idler pulley is used for
- Changing the direction of rotation
  - Running during no load period
  - For stopping the motion frequently
  - For adjusting the belt tension \*
  - None of the above.
1141. Which of the following machine is likely to be extensively used in a workshop manufacturing wire nails ?
- Lathe
  - Drilling machine
  - Power press
  - Broaching machine
  - Cold heading machine. \*
1142. In which grinding operation the peripheral speed of the grinding wheel will be highest ?
- Face grinding
  - Internal grinding
  - Circular grinding
  - Part off grinding \*
  - Surface grinding.
1143. The accuracy of a limit gauge can be checked by
- Vernier caliper
  - Micrometer
  - Slip gauge \*
  - Sine bar
  - Any of the above.
1144. The diameter of a round bar with close tolerances is quickly measured by
- Slip gauges
  - External micrometer
  - Vernier caliper
  - Snap gauge \*
  - Any of the above.
1145. While cutting double start threads of pitch 2 mm on a lathe, the cutting tool will advance by
- $\frac{1}{2}$  mm/revolution
  - 1 mm/revolution
  - $2$  mm/revolution
  - 4 mm/revolution \*
  - 8 mm/revolution.
1146. A drilling machine has spindle speeds from 70 to 800 rpm in eight steps. The fourth speed from the lowest will be
- 175 rpm
  - 198 rpm \*
  - 245 rpm
  - 300 rpm
  - 340 rpm.
1147. Kerosene is used as a cutting fluid while machining
- Aluminium \*
  - Magnesium
  - Brass
  - Copper
  - Low carbon steel.
1148. For a peripheral speed of 35 m/s, a grinding wheel of 800 mm diameter must rotate at
- 60 rpm
  - 85 rpm
  - 435 rpm
  - 835 rpm \*
  - 1600 rpm.
1149. Straight fluted drills are used for
- Brass and soft materials \*
  - Very hard materials
  - Brittle materials
  - Amorphous materials
  - Ferrous materials.

1150. For aluminium, the cutting speed on lathe is around  
 a. 30 m/min                      b. 100 m/min  
 c. 150 m/min                    d. 300 m/min \*  
 e. 1000 m/min.
1151. For soft steel the cutting speed for lathe operations is around  
 a. 30 m/min \*                    b. 100 m/min  
 c. 150 m/min                    d. 300 m/min  
 e. 150 m/min.
1152. The cutting speed is usually low in case of  
 a. Soft material  
 b. Regular shaped materials  
 c. Castings \*                    d. Stepped shafts  
 e. None of the above.
1153. Which of the following centre is used for holding hollow jobs on a lathe ?  
 a. Square centre                b. Half centre  
 c. Oil groove centre            d. Pipe centre \*  
 e. Revolving centre.
1154. Which of the following is an accessory for lathe ?  
 a. Lead screw                    b. Tail stock  
 c. Steady rest \*                d. Tool post  
 e. Head stock.
1155. Which of the following chucking device can be used on lathe ?  
 a. Dog carrier                    b. Face plate  
 c. Collets                        d. Mandrel  
 e. All of the above \*
1156. A steady rest is used for  
 a. Long jobs \*                    b. Irregular jobs  
 c. Large diameter jobs  
 d. Taper turning jobs            e. Threading jobs.
1157. Lathe bed is usually made of  
 a. Mild steel                      b. Cast iron \*  
 c. High speed steel              d. Alloy steel  
 e. Satellite.
1158. A pair of tumbler gears is used in  
 a. Centre lathe \*                b. Shaper  
 c. Milling machine               d. Grinding machines  
 e. Capstan lathe.
1159. A step cone pulley is provided on a lathe to  
 a. Reduce power consumption  
 b. To reverse the spindle rotation  
 c. To change spindle speeds \*  
 d. To drive the lead screw  
 e. For taper turning.
1160. A steady rest is used  
 a. During threading operation  
 b. During finishing operation  
 c. During taper turning  
 d. For supporting the bed  
 e. While cutting heavy and long jobs.\*
1161. A right hand tool on lathe machine will cut efficiently while cutting  
 a. From left to right            b. From right to left \*  
 c. In either direction           d. Taper  
 e. Grooved jobs.
1162. Which of the following is an accessory for lathe machine ?  
 a. Lead screw                    b. Cone pulley  
 c. Tool post                      d. Coolant pump \*  
 e. None of the above.
1163. Which of the following operation cannot be carried out on a lathe machine ?  
 a. Knurling  
 b. Blanking \*  
 c. Double start screw cutting  
 d. Taper turning  
 e. Facing.
1164. During which operation on a lathe machine, the spindle speed is usually the least ?  
 a. Finish turning                b. Parting off  
 c. Knurling \*                    d. Drilling  
 e. Rough turning.
1165. The standard taper provided on the tapered shank of drills is known as  
 a. Chapman taper                b. Morse taper \*  
 c. Jarno taper                    d. Taper No. 1  
 e. None of the above.
1166. For simple turning operation of lathe, the cutting speed is specified as 70 metres per minute. The cutting tool may be expected to be  
 a. Carbon steel                    b. Mild steel  
 c. Higher speed steel            d. Carbide \*  
 e. Diamond.
1167. The processes used for the machining of sintered and tungsten carbide is  
 a. Grinding process  
 b. Electroforming process \*  
 c. Explosive forming process  
 d. Turning process  
 e. None of the above.
1168. The relief angle for high speed steel tools is usually  
 a. 1° to 3°                        b. 3° to 10° \*  
 c. 11° to 15°                    d. 16° to 30°  
 e. 30° to 60°
1169. For aluminium casting to be turned on a lathe, which chuck would be preferred ?  
 a. Three jaw self-centring chuck  
 b. Four jaw independent chuck \*  
 c. Face plane  
 d. Collet chuck  
 e. Pneumatic chuck.



1170. Trepanning tool is used on  
 a. Lathes                      b. Planers \*  
 c. Milling machine          d. Cold heading machine  
 e. Power presses.
1171. Trepanning operation is used for  
 a. Beveling the edges  
 b. Finishing the ends of the job  
 c. Cutting grooves  
 d. Producing large holes \*  
 e. Under cutting.
1172. The common ratio for geometrical speeds in geometrical progression lies between  
 a. 5.0 to 10.0                  b. 2.0 to 5.0  
 c. 1.0 to 2.0                  d. 0.5 to 0.9 \*  
 e. 0.1 to 0.5.
1173. In broaching operation the accuracy that can be obtained is of the order of  
 a. 0.1 micron                  b. 1 micron \*  
 c. 10 micron                  d. 100 micron  
 e. 1000 micron.
1174. The shape of chips during broaching operation is  
 a. Continuous                  b. Short helical  
 c. Long-helical                d. Closed spirals \*  
 e. Small fragments.
1175. To break the continuous chips  
 a. Use a chip breaker in the tool \*  
 b. Cut the metal intermittently  
 c. Use high cutting speed and low feed  
 d. None of the above.
1176. Which of the following is a single point cutting tool?  
 a. Milling cutter                b. Hacksaw blade  
 c. Grinding wheel              d. Parting tool \*  
 e. File.
1177. Which one of the following is a natural abrasive ?  
 a. Alundum                      b. Corundum \*  
 c. Boron carbide                d. Carborundum  
 e. None of the above.
1178. Continuous chips in ductile metals is promoted by  
 a. Insufficient cooling        b. Small rake angle  
 c. Fine feed \*                  d. Low cutting speed.
1179. Continuous chips  
 a. Waste power due to heat generation \*  
 b. Cause good surface finish  
 c. Do not require cooling  
 d. Are easily disposable.
1180. Discontinuous chip in ductile material is produced because of  
 a. Sharp cutting edge        b. Insufficient cooling \*  
 c. Low friction                  d. Large rake angle.
1181. High helix drills are used for deep hole drilling in  
 a. Aluminium \*                b. Plastics  
 c. Rubber (hard)                d. Marble  
 e. Bakelite.
1182. Drilling speed in aluminium nearly  
 a. 3 to 5 m/min                b. 10 to 25 m/min  
 c. 35 to 50 m/min \*          d. 60 to 75 m/min  
 e. 80 to 100 m/min.
1183. Drilling operation is an example of  
 a. Multipoint cutting        b. Simple cutting  
 c. Oblique cutting \*          d. Orthogonal cutting  
 e. None of the above.
1184. Helical grooves are provided on a drill bit  
 a. To provide a passage for the coolant  
 b. To remove chips \*  
 c. To reduce the cost of the drill bit  
 d. To provide long cutting edge  
 e. To guide the cutting top.
1185. The clearance between the tips of a spark plug is checked by  
 a. Vernier caliper              b. Wire gauge  
 c. Feeler gauge \*                d. Delatometer  
 e. None of the above.
1186. The process of joining two slip gauges is known as  
 a. Pressing                      b. Soldering  
 c. Welding                      d. Wringing \*  
 e. Piercing.
1187. Choose the incorrect statement  
 a. Ductile materials in presence of fine feed and high cutting speed produce chips with built up edges \*.  
 b. Ductile material produce continuous chip  
 c. Both (a) and (b)  
 d. None of the above.
1188. The cutting edges of a twist drill are known as  
 a. Flanks                        b. Wedges  
 c. Flutes                        d. Lips \*  
 e. None of the above.
1189. A fly cutter is used on  
 a. Lathe                         b. Capstan lathe  
 c. Metal spinning lathe      d. Milling machine \*  
 e. Shaper.
1190. It is desired to remove large quantity of material from a job in shortest possible time, on a lathe using high speed steel cutter. Which of the following step will be helpful ?  
 a. Reduce spindle speed and increase depth of cut  
 b. Increase spindle speed and take light cuts  
 c. Decrease spindle speed and take light cuts  
 d. At the speed corresponding to cutting speed take roughing cuts of maximum possible depth \*  
 e. None of the above.

1191. Unequal lengths of lips of a twist drill are likely to result in
- Elliptical hole
  - Oversize hole \*
  - Low heat generation
  - Smooth surface
  - Low power consumption.
1192. Tungsten carbide tipper drill bits are used
- For slow drilling
  - For smooth surface
  - For drilling without coolant
  - For drilling on glass, ceramics, etc.\*
1193. Poor surface finish and fast wear of tool are the characteristics of
- Discontinuous chips
  - Continuous chips with built up edges \*
  - Continuous chips
  - Continuous chips
  - Inhomogeneous chips.
1194. Which of the following is a process of chipless machining ?
- Broaching
  - Hobbing
  - Gear shaving
  - Cold heading \*
  - Honing.
1195. In lathe machine the chasing dial is used during
- Taper turning
  - Thread cutting \*
  - Knurling
  - Drilling
  - Parting off.
1196. Chip breakers are used while machining
- ductile materials \*
  - brittle materials
  - both (a) and (b) above
  - none of the above.
1197. Knock out mechanism in press is used to
- chamfer the edges
  - eject out the component \*
  - shift the position of work piece after one operation
  - none of the above .
1198. In power presses bolster plate is used to
- mount the press tool \*
  - eject the pressed component
  - position the piece
  - cut edges.
1199. Which of the following is located within the bolster in a press ?
- Cushion \*
  - Ram
  - Bed plate
  - All of the above.
1200. While machining which of the following improves surface finish ?
- Increased depth of cut
  - Increased feed rate
  - Increased cutting speed \*
  - Formation of built-up edge.
1201. Hardness of diamond can be determined by
- Brinell hardness tester
  - Rockwell hardness tester
  - Vickers hardness tester
  - None of the above.\*
1202. As far as machinability is concerned, which of the following will be considered to be most inferior alloy?
- Bearing bronze
  - Monel metal \*
  - Gun metal
  - Malleable cast iron.
1203. Which of the following is considered to be non-machinable by conventional processes ?
- Grey cast iron
  - Cast copper
  - White cast iron \*
  - Silicon bronze.
1204. Which of the following is not true for diamond ?
- If the hardest substance known
  - Expensive to be shaped
  - It is ductile \*
  - It is also used as a cutting tool.
1205. Carbon tool steel are broadly classified into two categories as
- warping and non-warping
  - hard and brittle
  - water hardening and oil hardening \*
  - hard and soft.
1206. Carbon tool steels generally lose their hardness above
- 50°C
  - 100°C
  - 125°C
  - 200°C.\*
1207. Which of the following is a ferrous cutting tool ?
- Diamond
  - HSS \*
  - Cast carbides
  - Ceramics.
1208. Low helix drills are used for machining
- brass
  - bronze
  - bakelite
  - any of the above.\*
1209. Machinability is affected by
- tool geometry and material
  - cutting fluids
  - rigidity of tool and machine
  - all of the above.\*
1210. Which of the following is not used for orthogonal cutting ?
- Broaching
  - Sawing
  - Drills \*
  - Slotting cutter.
1211. All of the following are used for oblique cutting EXCEPT:
- Lathe tools
  - Milling cutters
  - Drills
  - Slotting cutter.\*
1212. Fly wheel is not provided in case of
- manually operated presses
  - crank type presses
  - hydraulic presses \*
  - all of the above.

1213. In shearing operation on a power press, total cutting force depends on  
 a. sharpness of cutting edge  
 b. clearance between die and punch  
 c. angle of shear on die and punch  
 d. all of the above.\*
1214. Gear cutters are specified by  
 a. cutter number \*      b. cutter diameter  
 c. no. of teeth      d. any of the above.
1215. Which of the following is a gear finishing operation?  
 a. Gear burnishing      b. Phosphate coating  
 c. Gear lapping      d. All of the above.\*
1216. A tool has tool signature 15, 15, 10, 10, 15, 10, (3mm). Which of the following angle is not of 15° ?  
 a. Side rake angle      b. Cutting edge angle  
 c. End relief angle \*      d. Back rake angle.
1217. A drill will not cut when  
 a. helix pitch is large      b. helix pitch is small  
 c. point angle is 118°      d. lip angle is zero \*
1218. Back rake angle while turning brass is  
 a. 0° \*      b. 5°  
 c. 10°      d. 22°.
1219. While tuning which of the following material back rake angle is the largest ?  
 a. Cast iron      b. Monel metal  
 c. Aluminium \*      d. Hard steel.
1220. Which of the following metal takes smallest side rake angle during turning ?  
 a. Brass \*      b. Cast iron  
 c. Monel metal      d. Aluminium.
1221. Glazing of grinding wheels is easily identified by  
 a. Shiny appearance on the face of the wheel \*  
 b. black spots on the grinding face  
 c. formation of cavities on the wheel  
 d. none of the above.
1222. Which of the following is the most common bond used in grinding wheels ?  
 a. Vitrified bond \*      c. Shellac bond  
 c. Rubber bond      d. Bakelite bond.
1223. In rubber bond for grinding wheels, sulphur is added to  
 a. act as vulcanising agent \*  
 b. dissipate heat during grinding operation  
 c. reduce shocks and vibrations  
 d. make the bond flexible.
1224. While specifying a grinding wheel, which of the following is the optional specification ?  
 a. Type of bond      b. Gram size  
 c. Structure \*      d. Grade.
1225. Loading of grinding wheel occurs when  
 a. part of grinding surface gives way  
 b. follow cavities are formed on the surface of grinding wheel  
 c. abrasive grains become clogged with particles of metal being ground \*  
 d. long cracks develop on grinding wheel from centre to outer diameter.
1226. For centreless grinding the surface speed is  
 a. 500 to 600 metres per minute  
 b. 600 to 900 metres per minute  
 c. 1200 to 1500 metres per minute.  
 d. 1500 to 1800 metres per minute.\*
1227. While grinding the increase in wheel speed, with constant feed rate, results in  
 a. shining surface  
 b. abrasive marks on work piece  
 c. reduction of the chip size \*  
 d. glazing of wheel.
1228. The speed of grinding wheel is limited by  
 a. type of bond  
 b. grinding operation  
 c. rigidity of grinding machine  
 d. all of the above.\*
- Questions 1229 and 1236 refer to data given below :**  
 A 18 mm hole is to be drilled in a work-piece having thickness of 50 mm. The cutting speed is to be 12 metres per minute and feed 0.2 mm per revolution.
1229. The spindle speed must be  
 a. 212 rpm \*      b. 315 rpm  
 c. 415 rpm      d. 600 rpm.
1230. The cutting time will be  
 a. 0.59 min      b. 1.18 min \*  
 c. 1.98 min      d. 2.24 min.
1231. On a die accurate holes are to be drilled. Which machine would you prefer for this operation ?  
 a. Radial drilling machine  
 b. Portable drilling machine  
 c. Multi-spindle machine  
 d. Jig boring machine.\*
1232. The efficiency of abrasive particles depends upon  
 a. purity  
 b. uniformity in composition  
 c. hardness  
 d. all of the above.\*
1233. Which of the following plate can be used for milling the sides of a hexagon nut ?  
 a. 24 hole circle plate \*  
 b. 32 hole circle plate  
 c. 45 hole circle plate  
 d. 55 hole circle plate.

1234. A gear is to have 14 teeth. Which of the following indexing movement can be used ?
- 3 complete turns on a 42 hole circle
  - 2 complete turns and 6 holes in 18 hole circle
  - 2 complete turns and 18 holes in 21 hole circle \*
  - 2 complete turns and 36 holes in 49 hole circle.
1235. Broaching is primarily done for
- better finish
  - mass production \*
  - cylindrical jobs
  - hard materials.
1236. Which of the following drilling machine is used for mass production ?
- Bench drilling machine
  - Radial drilling machine
  - Pistol drilling machine
  - Gang drilling machine.\*
1244. While machining copper alloys with HSS tools, the cutting speed is
- 20 to 30 m/min
  - 50 to 100 m/min
  - 100 to 150 m/min
  - 200 to 300 m/min.\*
1245. The depth of cut depends on the
- cutting speed
  - rigidity of machine tool
  - tool material
  - all of the above.\*
1246. Depth of cut is normally
- less for roughing operation and more for finishing operation
  - more for roughing operation and less for finishing operation \*
  - same for roughing as well as finishing operations.

**Questions 1237 to 1240 refer to data given below :**

A two-start external square thread of 10 mm pitch and outside diameter of 62 mm is to be cut on a centre lathe which has a 6 mm lead-screw. A second centre lathe which has a 6 mm pitch lead-screw.

1237. The depth of thread to give 0.12 mm clearance will be
- 1 mm
  - 2-5 mm
  - 5 mm \*
  - 10 mm.
1238. The lead of thread will be
- 5 mm
  - 10 mm
  - 20 mm \*
  - 40 mm.
1239. The core diameter is
- 62 mm
  - 57.24 mm
  - 51.76 mm \*
  - 43.45 mm.
1240. Gear ratio between the head stock spindle and the lathe lead-screw should be
- 50:40
  - 100:30 \*
  - 120:10
  - 30:30.

**Questions 1241 and 1247 refer to data given below :**

A metal cutting test was conducted on a lathe. The vertical force on the tool was 2000 N, depth of cut 3.0 mm and 6 cuts/mm. The overall efficiency of the machine may be taken as 80%.

1241. The pressure of the chip cross-sectional area on the tool will be
- 2000 MN/m<sup>2</sup>
  - 4000 MN/m<sup>2</sup>\*
  - 6000 MN/m<sup>2</sup>
  - 8000 MN/m<sup>2</sup>
1242. The power required for cutting the material is
- 0.5 kW
  - 1.0 kW
  - 1.25 kW \*
  - 2.50 kW.
1243. While using high speed steel tools, the cutting speed will be highest for which of the following steel ?
- Mild steel \*
  - Medium carbon steel
  - Alloy steel
  - Stainless steel.

**Question 1248 and 1258 refer to data given below :**

A brass pin has a length of 500 mm and job of 40 mm diameter. The pin is to be reduced to 38.8 mm in one pass, when cutting speed is 60 m/min and feed is 0.8 mm/min.

1247. The feed depends on
- finish required
  - depth of cut
  - rigidity of machine
  - all of the above.\*
1248. The spindle speed must be
- 239 RPM
  - 348 RPM
  - 478 RPM \*
  - 666 RPM.
1249. The machining time is
- 1.31 min \*
  - 2.62 min
  - 3.93 min
  - 5.24 min.
1250. At what rpm should a lathe be run to give a cutting speed of 25 m/min. When turning a rod of diameter 32 mm.
- 100 rpm
  - 160 rpm
  - 200 rpm
  - 250 rpm.\*
1251. Preferred numbers are the numbers in
- arithmetic progression
  - geometric progression \*
  - harmonic progression
  - logarithmic progression.
1252. The chips formed during broaching of steel are
- snarl
  - helical
  - closed spirals
  - fragments.\*
1253. The chips formed during broaching of steel are
- fragments
  - closed spirals \*
  - snarl
  - splinters.
1254. In all the following case chips produced are
- Milling of aluminium
  - Shaping of cast iron
  - Trepanning of steel \*
  - Facing of bronze.

1255. During planning the chips produced are in the form of  
 a. fragments \*                      b. closed spirals  
 c. long helics                        d. splinters.
1256. A strain gauge is a  
 a. measuring device                b. recording device  
 c. comparator                        d. sensor.\*
1257. Dial indicator is a  
 a. sensor                                b. comparator \*  
 c. recording device                d. transducer.
1258. Feeler gauge is used for measuring clearance between two  
 a. flat surfaces \*                      b. round surfaces  
 c. spherical surfaces                e. tapering surfaces.
1259. Solid punches are used for making holes having diameter equal to  
 a. (2.5 - 10) mm \*                    b. (4 - 6) mm  
 c. (1 - 3) mm.
1260. Hollow punches are used for making holes upto  
 a. 10 mm and above \*                b. (6 - 9) mm  
 c. (5 - 8) mm.
1261. The tool used for marking the location of bend line on thick metal/markings centres of holes is termed as  
 a. Centre punch \*                    b. Prick punch  
 c. Hollow punch.
1262. The shears used for making circular cuts are known as  
 a. Curved shears \*                    b. Straight shears  
 c. Any of (a) or (b).
1263. Straight shears are used for  
 a. Straight line cutting of sheets \*  
 b. Making circular cuts  
 c. Making irregular cuts.
1264. The chisels used in sheet metal work have  
 a. Rounded cutting edge \*  
 b. Straight cutting edge  
 c. Any of (a) or (b).
1265. A chisel is used for  
 a. Cutting the wood \*  
 b. Planing the wood  
 c. Making holes in the wood  
 d. None of the above.
1266. Planes are used  
 a. Measure the dimensions  
 b. Make the timber surfaces uniform and smooth \*  
 c. Chamfering the edges  
 d. Making holes in the Timber piece.
1267. A bench vice is used for  
 a. Clamping the job \*                b. Filing the job  
 c. Tapping the job.
1268. Work holding faces of a bench vice are  
 a. Serrated \*                            b. Grooved  
 c. Smooth.
1269. Plate liners used between the vice-jaw and the work piece are made of  
 a. Copper or Tin \*                    b. Mild steel  
 c. Hard steel.
1270. Device used in the fitting shop used for holding round bars during marking/centre drilling thin faces is known as  
 a. V - block \*                        b. Bench vice  
 c. Surface plate.
1271. Material used for surface plate in fitting shop is  
 a. Cast iron \*                        b. Mild steel  
 c. Cast steel.
1272. The length of hack saw blades is  
 a. 200 - 300 mm \*                    b. 300 mm - 400 mm  
 c. 150 mm - 250 mm.
1273. Usual thickness of a hacksaw blade is  
 a. 0.7 mm \*                            b. 1 mm  
 c. 0.4 mm.
1274. Hacksaw blades cut in  
 a. Forward stroke only \*  
 b. Backward stroke only  
 c. Both the forward and backward stroke.
1275. Usual width of a hacksaw blade is  
 a. 12.7 mm \*                        b. 15 mm  
 c. 10 mm.
1276. Hacksaw used for cutting steel, cast iron, aluminium etc. has the following number of teeth per centimeter  
 a. 7 \*                                    b. 10  
 c. 12.
1277. Teeth of a hacksaw are  
 a. Bent alternately in opposite directions \*  
 b. Bent in one direction only  
 c. In a single plane.
1278. While cutting with a hacksaw, the number of teeth contacting the job should be  
 a. More than one \*                    b. Only one  
 c. Any of (a) or (b).
1279. The weight of hammers used in a fitting shop is  
 a. 0.45 kg - 0.70 kg \*                b. 0.75 - 1 kg  
 c. 0.25 kg - 0.50 kg.
1280. A set hammer is made of  
 a. High carbon steel  
 b. Tool steel and hardened \*  
 c. Mild steel.

1281. A cutting tool fails due to
- crater formation
  - crater wear and flank wear
  - crater wear and flank wear meeting to cause crumbling of cutting edge.\*
  - none of the above.
1282. The tool may fail suddenly because of
- crater wear
  - flank wear
  - both crater and flank wear
  - spalling.\*
1283. A tool is said to have worn if
- it produces discontinuous chips
  - its cutting angles have changed \*
  - heat produced in cutting is large
  - none of the above.
1284. Choose the incorrect statement  
The mechanism of tool wear is
- oxidation
  - reduction \*
  - diffusion
  - none of the above.
1285. Tool life cannot be defined as
- number of minutes after which tool failed \*
  - machine time in minutes for which tool performed satisfactorily
  - average length of cut per cutting edge
  - none of the above.
1286. An ideal tool material is the one which
- has very long life
  - has same life at all cutting speeds \*
  - produces no heat during cutting
  - none of the above.
1296. Cutting speed of three tool materials, viz : H.S.S., carbide and ceramic for a given work materials and fixed tool life will increase in this order.
- carbide H.S.S. ceramic
  - carbide ceramic H.S.S.
  - H.S.S. carbide ceramic \*
  - none of the above.
1297. Choose incorrect statement. With increasing cutting speed
- machining cost decreases
  - tool cost increases
  - total cost decreases \*
  - None of the above.
1298. Which tool can be used to measure the alignment of a rotor shaft or the plane of rotation of a disk?
- Dial indicator. \*
  - Shaft gauge.
  - Protractor.
1299. (Refer to figure 1.6) The measurement reading on the illustrated micrometer is
- 0.2851.\*
  - 0.2911.
  - 0.2901.
1300. Identify the correct statement.
- An outside micrometer is limited to measuring diameters.
  - Tools used on certificated aircraft must be an approved type.
  - Dividers do not provide a reading when used as a measuring device.\*
1301. (Refer to figure 1.7) What is the measurement reading on the vernier caliper scale ?
- 1.411 inches.
  - 1.436 inches.\*
  - 1.700 inches.
1302. Which tool is used to measure the clearance between a surface plate and a relatively narrow surface being checked for flatness ?
- Depth gauge.
  - Thickness gauge.\*
  - Dial indicator.
1303. Which number represents the vernier scale graduation of a micrometer ?
- .00001.
  - .001.
  - .0001.\*
1304. Which tool is used to find the centre of a shaft or other cylindrical work ?
- Combination set.\*
  - Dial indicator.
  - Micrometer caliper.
1305. (Refer to figure 1.8) What does the micrometer read ?
- .2974.
  - .3004.\*
  - .3108.
1306. If it is necessary to accurately measure the diameter of a hole approximately 1/4 inch in diameter, the mechanic should use a
- telescoping gauge and determine the size of the hole by taking a micrometer reading of the adjustable end of the telescoping gauge.
  - 0 to 1 inch inside micrometer and read the measurement directly from the micrometer.
  - small-hole gauge and determine the size of the hole by taking a micrometer reading of the ball end of the gauge.\*

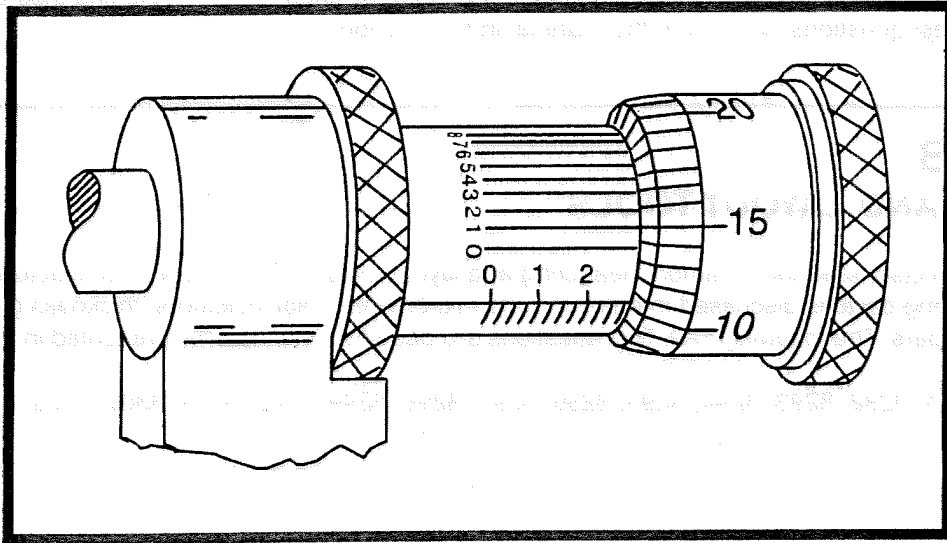


Fig. 1.6 Precision Measurement.

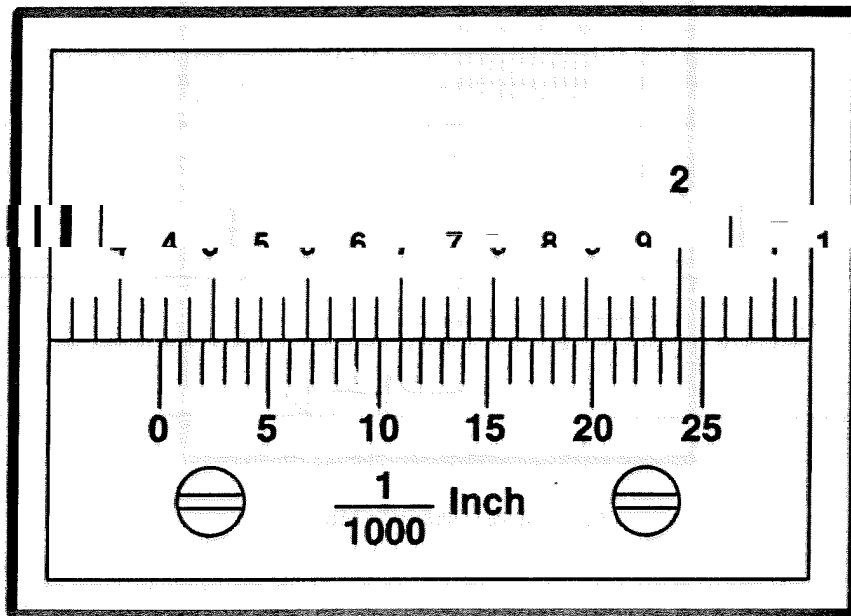


Fig. 1.7 Precision Measurement.

1307. (Refer to figure 1.9) The measurement reading on the micrometer is
- .2758.
  - .2702.
  - .2792.\*
1308. What tool is generally used to set a divider to an exact dimension ?
- Machinist scale.\*
  - Surface gauge.
  - Dial indicator.
1309. What tool is generally used to calibrate a micrometer or check its accuracy ?
- Gauge block.\*
  - Dial indicator.
  - Machinist scale.
1310. What precision measuring tool is used for measuring crankpin and main bearing journals for out-of-round wear ?
- Dial gauge.
  - Micrometer caliper.\*
  - Depth gauge.
1311. The side clearance of piston rings are measured with a
- micrometer caliper gauge.
  - thickness gauge.\*
  - dial gauge.
1312. How can the dimensional inspection of a bearing in a rocker arm be accomplished ?
- Depth gauge and micrometer.
  - Thickness gauge and push-fit arbor.
  - Telescopic gauge and micrometer.\*
1313. The twist of a connecting rod is checked by installing push-fit arbors in both ends, supported by parallel steel bars on a surface plate. Measurements are taken between the arbor and the parallel bar with a
- dial gauge.
  - height gauge.
  - thickness gauge.\*

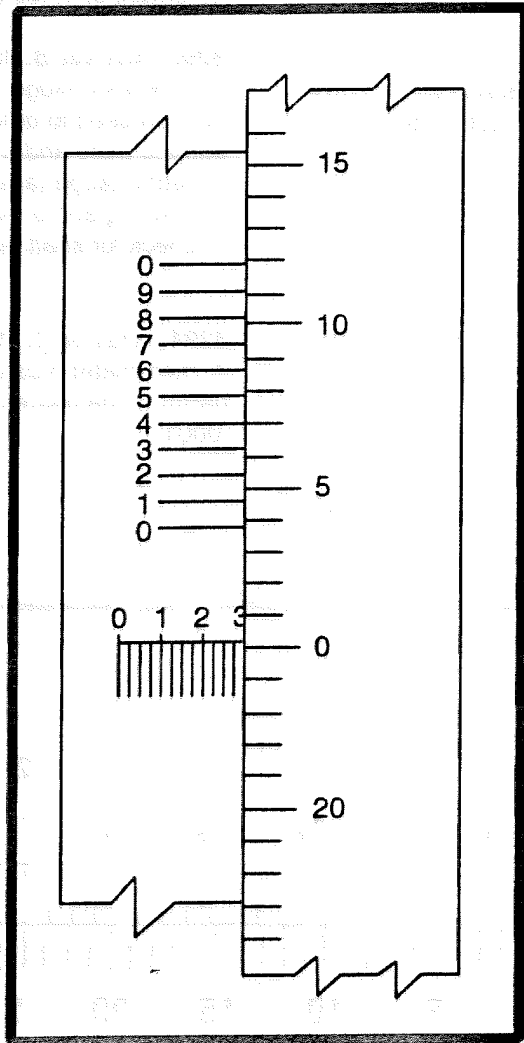


Fig. 1.8 Precision Measurement.

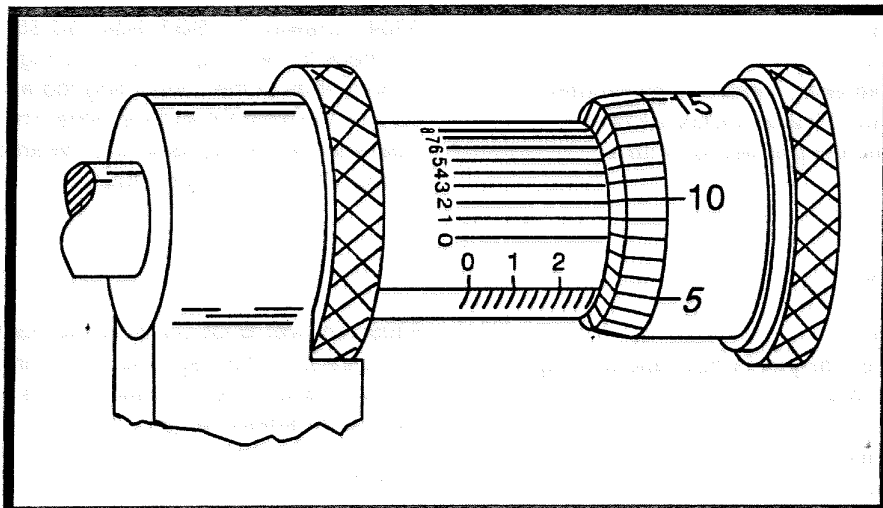


Fig. 1.9 Precision Measurement.



1314. The clearance between the piston rings and the ring lands is measured with a
- micrometer caliper.
  - thickness gauge.\*
  - depth gauge.
1315. What may be used to check the stem on a poppet-type valve for stretch ?
- Dial indicator.
  - Micrometer.\*
  - Telescoping gauge.
1316. Which tool can be used to determine piston pin out-of-round wear ?
- Telescopic gauge.
  - Micrometer caliper.\*
  - Dial indicator.
1317. The broaching operation in which the tool moves past the stationary work is known as
- push broaching
  - pull broaching\*
  - continuous broaching
  - surface broaching
  - straight broaching
1318. The work piece motion and tool motion respectively in a horizontal boring machine are
- stationary and rotational
  - rotational and translational
  - translational and rotational
  - stationary and rotational with translation\*
  - rotational with translation and stationary
1319. In which of the following operation on lathe, the spindle speed will be minimum
- knurling
  - fine finishing
  - taper turning
  - parting off
  - thread cutting\*
1320. A side rake is seldom ground in
- broaching tool
  - lathe tool
  - shaper tool
  - planer tool
  - both 'c' and 'd' are correct\*
1321. In most high speed milling cutters, positive radial rake angle is
- $2-6^\circ$
  - $7-10^\circ$
  - $10-15^\circ$ \*
  - $15-20^\circ$
  - $20-25^\circ$
1322. In lathe, the carriage and tail stock are guided on
- same guideways
  - different guideways\*
  - any one of the above
  - not guided on guideways
  - none of the above
1323. The unit of a lathe which houses the lathe spindle and control levers for speed selection is called a
- head stock\*
  - tail stock
  - feed box
  - carriage
  - apron
1324. The back rake and side rake of round nose tool are
- $+5$  to  $+10^\circ$
  - $-5$  to  $-10^\circ$
  - zero\*
  - $+10$  to  $+15^\circ$
  - $-10$  to  $-15^\circ$
1325. The wear on the cross side or compound rest can be taken up by tightening the adjustable
- jigs
  - plates
  - gibs\*
  - pins
  - screws
1326. The work piece motion and tool motion respectively in vertical boring machine are
- stationary and rotational
  - rotational and translational\*
  - translational and rotational
  - stationary and rotational with translation
  - rotational with translation and stationary
1327. Tubular gears are the gears used in
- milling machine to change direction of rotation by  $90^\circ$
  - dividing head
  - lathe for increasing/decreasing cutting speed
  - lathe for cutting threads
  - lathe for reversing direction of rotation\*
1328. In machine tools, chatter is due to
- free vibrations
  - random vibrations
  - forced vibrations
  - self-excited vibrations\*
  - cutting vibrations
1329. The usual ratio of forward and return stroke in shaper is
- 2 : 1
  - 1 : 2
  - 2 : 3
  - 3 : 2\*
  - 3 : 1

1330. If  $l$  be the length of job,  $d$  its diameter,  $f$  the feed, and  $n$  the spindle speed, then time for turning the job is equal to
- $\frac{l}{dn}$
  - $\frac{l}{nf}$  \*
  - $\frac{d}{nf}$
  - $\frac{nf}{l}$
  - $\frac{nf}{d}$
1331. Half nut is connected with
- milling machine
  - locking device
  - jigs and fixtures
  - thread cutting on lathe \*
  - quick engaging and disengaging devices
1332. Lathe bed is usually made of
- structural steel
  - stainless steel
  - cast iron \*
  - mild steel
  - non-ferrous materials
1333. Lathe spindle has got
- internal threads
  - external threads \*
  - taper threads
  - no threads
  - none of the above
1334. Which of the following lathe operations requires that the cutting edge of a tool bit be placed exactly on the work centre-line ?
- boring
  - drilling
  - facing \*
  - turning
  - chamfering
1335. lathe centres are provided with the following standard taper
- Morse \*
  - British
  - metric
  - sharpe
  - any taper
1336. Brown and sharp taper is generally used in
- lathes
  - milling machines \*
  - shapers
  - drills
  - broaching machines
1337. On screw machines having cross and vertical slides, cutting off operations are usually performed by the
- horizontal slide
  - vertical slide \*
  - cross-slide
  - cross-drilling attachment
  - special attachment
1338. In order to turn taper on length  $l$  with two end diameters  $d_1$  and  $d_2$  over the tailstock set over required is
- $d_1 - d_2$
  - $\frac{d_1 - d_2}{2}$  \*
  - $\frac{d_1 - d_2}{2l}$
  - $\frac{d_1 - d_2}{l}$
  - $\frac{2(d_1 - d_2)}{l}$
1339. Internal or external tapers on a lathe can be turned by
- face turning attachment
  - taper turning attachment \*
  - sliding attachment
  - morse taper attachment
  - offsetting tailstock
1340. Quick return mechanism is used in
- milling machine
  - broaching machine
  - grinding machine
  - slotter \*
  - welding machine
1341. Which of the following machines does not require quick return mechanism
- slotter
  - planer
  - shaper
  - broaching \*
  - none of the above
1342. The size of a power circular saw is indicated by the
- blade diameter \*
  - motor horse power
  - saw weight
  - number of gullets
  - maximum depth of cut
1343. Circular saw blades are specified by their diameter, number of teeth and
- gauge
  - maximum rpm
  - arbor hole \*
  - number of gullets
  - all of the above

1344. In blanking operation, the angle of shear is provided on
- die \*
  - punch
  - both on punch and die
  - not provided at all
  - none of the above
1345. The shear angle in the piercing operation is provided on
- die
  - punch \*
  - half on die and half on punch
  - die or punch depending on material and thickness of sheet
  - not provided at all
1346. The clearance in blanking operation is provided on
- die
  - punch \*
  - hair on die and half on punch
  - die or punch depending on material and thickness of sheet
  - not provided at all
1347. With increasing angle of shear, the force on punch
- increases linearly
  - decreases linearly \*
  - decreases as square of shear angle
  - increases as square of angle of shear
  - none of the above
1348. Size of the smallest hole that can be punched is given by
- $4t \frac{f_s}{f_c}$  \*
  - $2t \frac{f_s}{f_c}$
  - $4t \frac{f_c}{f_s}$
  - $2t \frac{f_c}{f_s}$
  - none of the above
- where,  $t$  = sheet thickness  
 $f_c$  = allowable compressive stress on punch  
 $f_s$  = ultimate shear stress of sheet
1349. In piercing and punching operations, the angle of shear is provided on
- die
  - punch \*
  - both on punch and die
  - not provided at all
  - none of the above
1350. In piercing operation, the clearance is provided on
- die \*
  - punch
  - half of die and half on punch
  - may be provided on any member
  - none of the above



## CHAPTER - 2

# DETAILED KNOWLEDGE OF IDENTIFICATION, TERMINOLOGY, CORRECT USE AND INSPECTION OF AIRCRAFT BOLTS, NUTS, RIVETS, SCREWS AND LOCKING DEVICES OF BRITISH AND AMERICAN SYSTEMS

1. In drilling and tapping cast iron for studs, it is necessary to tap to a particular depth, so that the strength of the cast iron threads in shear may equal the tensile strength of the bolt. The depth in terms of stud diameter is
- 1 time
  - 1.5 times \*
  - 2 times
  - 2.5 times
  - 3 times

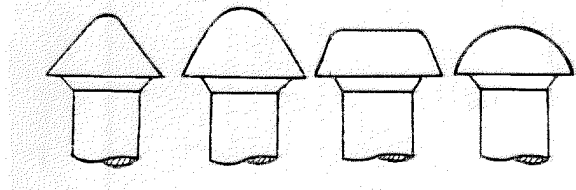


Fig.2.2

2. In riveted joints, butt joints are usually preferred over lap joints. The reason for this is that
- butt joint is neat
  - joint efficiency is more in the case of butt joint
  - it is convenient to make butt joint
  - lap joint usually fails due to server stresses in the rivet \*
  - butt joint is symmertrical
3. Which is the preferred method for making hole in plate for riveted joints
- punching
  - reaming
  - punching and reaming
  - drilling \*
  - tapping

6. If rivet diameter is 48 mm, rivet hole diameter will be approximately
- 48 mm
  - 47 mm
  - 49 mm
  - 50 mm \*
  - 52 mm

7. Fig. 2.3 shows a
- nut
  - castle nut
  - flange nut \*
  - shank nut
  - locking nut



Fig.2.3

4. The rivet heads used for general purposes shown in Fig. 2.1 (from left to right) are
- snap, pan, mushroom, round countersunk
  - snap, pan, round countersunk, mushroom \*
  - pan, snap, round countersunk, mushroom
  - flat, snap, mushroom, countersunk
  - snap, flat countersnak, pan, flat

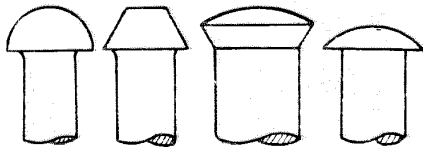


Fig.2.1

8. Fig.2.4 shows a key used for heavy work. It is
- kennedy key \*
  - twin key
  - tangent key
  - woodruff key
  - square key

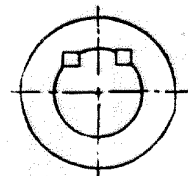


Fig.2.4

5. The boiler rivet heads shown in Fig. 2.2 from left to right are
- steeple, conical, pan, ellipsoid \*
  - conical, snap, countersunk, pan
  - steeple, snap, pan, ellipsoid
  - pan, snap, countersunk, ellipsoid
  - conical, steeple, pan, snap

9. A rivet is specified by
- shank diameter \*
  - length of rivet
  - type of head
  - length of tail

10. A riveted joint is a ..... fastening.  
a. permanent \*                      b. temporary
11. When plates are fastened by a rivet, the holes in the plates should be made by punching and reaming.  
a. Correct                              b. Incorrect \*
12. The diameter of the rivet hole is usually ..... the nominal diameter of the rivet.  
a. equal to                              b. less than  
c. more than \*
13. According to Unwin's formula, the relation between the diameter of rivet hole (d) and the thickness of plate (t) is given by  
a.  $d = t$                                   b.  $d = 1.6\sqrt{t}$   
c.  $d = 2t$                                   d.  $d = 6\sqrt{t}$  \*  
where d and t are in mm.
14. The rivet head used for boiler plate riveting is usually  
a. snap head \*                          b. pan head  
c. counter sunk head                  d. conical head
15. The centre to centre distance between two consecutive rivets in a row, is called  
a. margin                                  b. pitch \*  
c. back pitch                              d. diagonal pitch
16. The objective of caulking in a riveted joint is to make the joint  
a. free from corrosion  
b. stronger in tension  
c. free from stress  
d. leak - proof \*
17. In order to avoid tearing of the plate at an edge, the distance from the centre line of the rivet hole to the nearest edge of the plate should be equal to  
a. d                                          b.  $1.5d$  \*  
c.  $2d$                                           d.  $2.5d$   
where d = Diameter of rivet hole.
18. The efficiency of a riveted joint is equal to  
a.  $P_t / P$   
b.  $P_s / P$   
c.  $P_c / P$   
d. least of  $P_t$ ,  $P_s$  and  $P_c / P$  \*
19. If the tearing efficiency of a riveted joint is 50%, then the ratio of diameter of rivet to the pitch is  
a. 0.20                                      b. 0.30  
c. 0.50 \*                                      d. 0.70
20. According to Indian standards, the diameter of rivet hole is made larger than the basic size of rivet by  
a. 0.5 mm upto rivet diameter of 24 mm.  
b. 1 mm for rivet diameter from 27 mm to 36 mm  
c. 2 mm for rivet diameter from 39 mm to 48 mm  
d. all of the above \*
21. The largest diameter of an external or internal screw thread is known as  
a. minor diameter                      b. major diameter \*  
c. pitch diameter                        d. none of these
22. The pitch diameter is the ..... diameter of an external or internal screw thread.  
a. effective \*  
b. smallest  
c. largest
23. The major diameter of a screw thread is also known as core or root diameter.  
a. Yes                                          b. No \*
24. The minor diameter of a screw thread is also known as outside or nominal diameter.  
a. Right                                        b. Wrong \*
25. The smallest diameter of an external or internal screw thread is known as  
a. minor diameter \*                      b. major diameter  
c. pitch diameter                        d. none of these
26. In a nut and bolt, the diameter at which the ridges on the bolt are in complete touch with the ridges of the corresponding nut, is called pitch diameter.  
a. Correct \*                                  b. Incorrect
27. A screw is specified by its  
a. major diameter \*                      b. minor diameter  
c. pitch diameter                        d. pitch
28. Which of the following statement is correct ?  
a. The distance from a point on one thread to the corresponding point on the next thread is called pitch.  
b. The distance which a screw thread advances axially in one rotation of the nut is called lead.  
c. In single start threads, lead is equal to pitch.  
d. all of the above \*
29. A bolt has  
a. threads for the nut at one end and head at the other end \*  
b. head at one end and the other end fits into a tapped hole one of the parts to be fastened  
c. threads at both ends  
d. pointed threads
30. A tap bolt has  
a. threads for the nut at one end and head at the other end  
b. head at one end and the other end fits into a tapped hole one of the parts to be fastened \*  
c. threads at both ends  
d. pointed threads
31. Which of the following has threads at both ends ?  
a. Bolt  
b. Tap bolt  
c. Stud \*  
d. none of these

32. The machine screws are
- slotted for a screw driver and are generally used with a nut \*
  - similar to tap bolts except that they are of small size and a variety of shapes of heads are available.
  - used to prevent relative motion between the two parts.
  - none of the above
33. The set screws are used to prevent relative motion between the two parts.
- Right \*
  - Wrong
34. The cap screws are
- slotted for a screw driver and are generally used with a nut
  - similar to tap bolts except that they are of small size and a variety of shapes of heads are available \*
  - used to prevent relative motion between the two parts
  - none of the above
35. A locking device in which the bottom cylindrical portion is recessed to receive the tip of the locking set screw, is called
- castle nut
  - jam nut
  - ring nut \*
  - sawn nut
36. A jam nut is a locking device in which
- a thinner nut is tightened down over a thicker or main nut and the main nut is tightened against the thinner nut by loosening \*
  - a slot is cut in line with the centre of each face and a split pin passes through two slots in the nut and a hole in the bolt, so that a positive lock is obtained unless the pin shears
  - a slot is cut about half way through the nut and a small screw is tightened between the nut and the bolt in order to produce more friction
  - the bottom cylindrical portion is recessed to receive the tip of the locking set screw
37. A castle nut is a locking device in which
- a thinner nut is tightened down over a thicker or main nut and the main nut is tightened against the thinner nut by loosening
  - a slot is cut in line with the centre of each face and a split pin passes through two slots in the nut and a hole in the bolt, so that a positive lock is obtained unless the pin shears \*
  - a slot is cut about half way through the nut and a small screw is tightened between the nut and the bolt in order to produce more friction
  - the bottom cylindrical portion is recessed to receive the tip of the locking set screw
38. The number of slots in a 25 mm castle nut is
- 2
  - 4
  - 6 \*
  - 8
39. In a sawn nut, a slot is cut about half way through the nut and a small screw is tightened between the nut and the bolt in order to produce more friction.
- Agree \*
  - Disagree
40. The diameter of washer is generally taken bigger than the nut size
- True \*
  - False
41. The washer is generally specified by its
- outer diameter
  - hole diameter \*
  - thickness
  - mean diameter
42. The function of the washer is to
- fill up the axial gap
  - provide bearing area \*
  - provide cushioning effect
  - absorb shocks and vibrations
43. A locking device extensively used in Aviation industry is a
- jam nut
  - castle nut \*
  - sawn nut
  - ring nut
44. A bolt of M 24 x 2 means that
- the pitch of the thread is 24 mm & depth is 2 mm
  - cross-sectional area of the thread is 24 mm<sup>2</sup>
  - the nominal diameter of bolt is 24 mm and pitch is 2 mm.\*
  - the effective diameter of bolt is 24 mm and there are 2 thread per cm
45. A bolt is designed on the basis of ..... with a large factor of safety.
- direct tensile stress \*
  - direct compressive stress
  - direct bending stress
  - direct shear stress
46. When a bolt is subjected to an external load, the stress induced in the bolt will be
- tensile stress
  - shear stress
  - combined tensile and shear stress
  - any one of these \*
47. When a nut is tightened by placing a washer below it, the bolt will be subjected to
- tensile stress \*
  - compressive stress
  - shear stress
  - none of these
48. In a flange coupling, the bolts are subjected to
- tensile stress
  - compressive stress
  - shear stress \*
  - none of these
49. The eye bolts are used for
- transmission of power
  - locking devices
  - lifting and transporting heavy machines \*
  - absorbing shocks and vibrations

50. In a bolt, the plane of shear should be across the threaded portion of the shank.  
a. Right b. Wrong \*
51. The resultant axial load on a bolt depends upon  
a. external load applied  
b. initial tension due to tightening of the bolt  
c. relative elastic yielding of the bolt and the connected members  
d. all of the above \*
52. When a bolt is subjected to shock loading, the resilience of the bolt should be considered in order to prevent breakage at the  
a. head b. shank  
c. thread \* d. middle
53. In an ordinary bolt, the effect of the impulsive loads applied axially is concentrated on the cross-sectional area at the root of the threads.  
a. Yes \* b. No
54. The stress in the threaded part of the bolt will be ..... as compared to the shank.  
a. same b. higher \*  
c. lower
55. The shock absorbing capacity of a bolt may be increased by  
a. increasing its shank diameter  
b. decreasing its shank diameter \*  
c. tightening the bolt properly  
d. making the shank diameter equal to core diameter of thread
56. The resilience of a bolt may be increased by  
a. increasing its shank diameter  
b. increasing its length \*  
c. decreasing its shank diameter  
d. decreasing its length
57. A bolt of uniform strength can be developed by  
a. keeping the core diameter of threads equal to the diameter of unthreaded portion of the bolt \*  
b. keeping the core diameter smaller than the diameter of the unthreaded portion  
c. keeping the nominal diameter of threads equal to the diameter of unthreaded portion of the bolt  
d. none of the above
58. In order to obtain the bolts of uniform strength, an axial hole is drilled through the head as far as the threaded portion such that the area of shank becomes equal to the root area of the thread.  
a. True \* b. False
59. When a bolt and nut is made of mild steel, then the effective height of nut is made equal to  
a. 0.5 d b. 0.75 d  
d. d \* d. 1.25 d  
where d = Nominal diameter of bolt
60. The most important dimension in the design of a nut is  
a. pitch diameter b. inside diameter  
c. outside diameter d. height \*
61. The taper on cotter varies from  
a. 1 in 15 to 1 in 10 b. 1 in 24 to 1 in 20  
c. 1 in 32 to 1 in 24 d. 1 in 48 to 1 in 24 \*
62. The draw of cotter should not be more than  
a. 3 mm \* b. 6mm  
c. 8mm d. 12mm
63. A cotter joint is used to transmit  
a. axial tensile load only  
b. axial compressive load only  
c. combined axial and twisting loads  
d. axial tensile or compressive loads \*
64. A cotter joint is used to connect two ..... rods.  
a. co-axial \*  
b. perpendicular  
c. parallel
65. Which of the following cotter joint will be used to connect strap end of a connecting rod ?  
a. Spigot and socket cotter joint  
b. sleeve and cotter joint  
c. Gib and cotter joint \*  
d. any one of these
66. The taper on cotter and slot is made on both the sides.  
a. Agree b. Disagree \*
67. The diameter of knuckle pin in a knuckle joint is usually taken as  
a. 0.5 d b. 0.8 d  
c. d \* d. 1.2 d  
where d = Diameter of the rod
68. In a turnbuckle, if one of the rods has left hands threads, then the other rod will have  
a. right hand threads \* b. left hand threads  
c. multiple threads d. pointed threads
69. A turn buckle is used to connect two round rods subjected to tensile loading and requiring subsequent adjustment for tightening or loosening.  
a. Yes \* b. No
70. Which of the following statement is wrong ?  
a. A key is used as a temporary fastening.  
b. A key is subjected to tensile stresses.\*  
c. A key is always inserted parallel to the axis of the shaft.  
d. A key prevents relative motion between the shaft and boss of the pulley.
71. The taper on a rectangular sunk key is  
a. 1 in 16 b. 1 in 32  
c. 1 in 48 d. 1 in 100 \*

72. The taper on key is given on  
 a. bottom side only                      b. top side only \*  
 c. on both sides                          d. any side
73. The usual proportion for the width of key is  
 a.  $d/8$                                       b.  $d/6$   
 c.  $d/4$  \*                                    d.  $d/2$   
 Where  $d$  = diameter of shaft or diameter of hole in the hub
74. The thickness of key is usually taken equal to one-sixth of diameter of shaft.  
 a. Yes \*                                      b. No
75. A taper key which fits half in the key way of the hub and half in the key way of shaft, is known as  
 a. sunk key \*                                b. flat saddle key  
 c. hollow saddle key                      d. tangent key
76. A hollow saddle key is  
 a. a taper key which fits half in the key way of hub and half in the key way of shaft  
 b. a taper key which fits in a key way of the hub and is flat on the shaft  
 c. a taper key which fits in a key way of the hub and the bottom of the key is shaped to fit the curved surface of the shaft \*  
 d. provided in pairs at right angles and each key is to withstand torsion in one direction only
77. A tangent key is provided in pairs at right angles and each key is to withstand torsion in one direction only.  
 a. Agree \*                                    b. Disagree
78. Which of the following statement is correct ?  
 a. A parallel sunk key is a taperless key.  
 b. A parallel sunk key may be rectangular or square in cross-section.  
 c. A flat saddle key is a taper key which fits in a key way of the hub and is flat on the shaft.  
 d. all of the above \*
79. A tapered key which fits in a key way in the hub and is flat on the shaft, is known as  
 a. feather key                                b. gib-head key  
 c. wood ruff key                            d. flat saddle key \*
80. A wood-ruff key is  
 a. a tapered key with head at one end  
 b. fitted in pairs at right angles  
 c. capable of tilting in a recess milled out in the shaft\*  
 d. all of the above
81. A saddle key ..... power through frictional resistance only.  
 a. transmits \*                                b. does not transmit
82. A tapered key which fits in a key way in the hub and the bottom of which is shaped to fit the curved surface of the shaft, is known as hollow saddle key.  
 a. Correct \*                                    b. Incorrect
83. A feather key is generally  
 a. loose in shaft and tight in hub  
 b. tight in shaft and loose in hub \*  
 c. tight in both shaft and hub  
 d. loose in both shaft and hub
84. Which of the following key is preferred for the condition when a large amount of impact torque is to be transmitted in both direction of rotation ?  
 a. Woodruff key                            b. Feather key  
 c. Gib-head key                             d. Tangent key \*
85. The effect of key ways on shaft is to reduce its load carrying capacity and to increase its torsional rigidity.  
 a. True                                        b. False \*
86. A key way lowers  
 a. the strength of the shaft  
 b. the rigidity of the shaft  
 c. both the strength and rigidity of the shaft \*  
 d. the ductility of the shaft
87. A flange coupling is a type of rigid coupling.  
 a. Right \*                                      b. Wrong
88. An universal coupling is a type of ..... coupling  
 a. rigid  
 b. flexible \*
89. An universal coupling is used to connect two shafts  
 a. which are perfectly aligned  
 b. which are not in exact alignment  
 c. have lateral misalignment  
 d. whose axes intersect at a small angle \*
90. A flange coupling is used to connect two shafts  
 a. which are perfectly aligned \*  
 b. which are not in exact alignment  
 c. have lateral misalignment  
 d. whose axes intersect at a small angle
91. A bushed pin flexible coupling is used to connect two shafts whose axes intersect at a small angle.  
 a. Yes                                         b. No \*
92. Oldham coupling is used to connect two shafts  
 a. which are perfectly aligned  
 b. which are not in exact alignment  
 c. which have lateral misalignment \*  
 d. whose axes intersect at a small angle
93. Oldham coupling is used to transmit power between two parallel shafts which are slightly offset.  
 a. True \*                                        b. False
94. The sleeve or muff coupling is designed as a  
 a. thin cylinder  
 b. thick cylinder  
 c. solid shaft  
 d. hollow shaft \*



95. Which of the following screw thread is adopted for power transmission in either direction ?  
 a. Acme threads                      b. Square threads \*  
 c. Buttress threads                  d. Multiple threads
96. Which of the following screw thread is used for power transmission in one direction only.  
 a. Acme threads                      b. Square threads  
 c. Buttress threads \*                d. Multiple threads
97. Multiple threads are used to secure  
 a. low efficiency  
 b. high efficiency \*  
 c. high load lifting capacity  
 d. high mechanical advantage
98. Screws used for power transmission should have  
 a. low efficiency                      b. high efficiency \*  
 c. very fine threads                  d. strong teeth
99. Screws jacks have multiple threads.  
 a. Agree                                  b. Disagree \*
100. The load placed at the top of the screw in a mechanical screw jack is prevented from rotation by providing a swivelling mechanism.  
 a. Correct \*                              b. Incorrect
101. When the screw in a mechanical screw jack rotates, the load kept on the top of it moves  
 a. axially upwards  
 b. axially downwards  
 c. axially upwards or downwards \*  
 d. none of these
102. A screw will be self locking, if  
 a. friction angle is less than helix angle  
 b. friction angle is more than helix angle \*  
 c. friction angle is equal to helix angle  
 d. efficiency of screw is 100 %
103. A screw is said to be over hauling screw, if the  
 a. friction angle is less than helix angle \*  
 b. friction angle is more than helix angle  
 c. friction angle is equal to helix angle  
 d. efficiency of screw is 100 %
104. In order to ensure self locking in a screw jack, it is essential that helix angle is ..... friction angle.  
 a. larger than  
 b. smaller than \*  
 c. equal to
105. While designing a screw in a screw hack against bucking failure, the end conditions for the screw are taken as  
 a. both the ends fixed  
 b. both the ends hinged  
 c. one end fixed and the other end hinged  
 d. one end fixed and the other end free \*
106. Broken bolts and studs can be removed from hole by the following tool  
 a. Ezy-out \*  
 b. screw driver  
 c. cold punch  
 d. telescopic rod  
 e. emery rod
107. Nominal diameter of a bolt or screw is  
 a. larger than the actual diameter \*  
 b. smaller than the actual diameter  
 c. same as the actual diameter  
 d. depends on the range in which actual diameter falls  
 e. none of the above
108. The type of rivet shown in Fig.2.5  
 a. Semi-tubular                          b. Tubular  
 c. Bifurcated \*                          d. Compression  
 e. Snap.

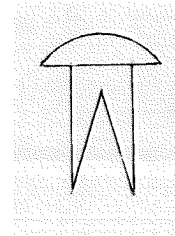


Fig.2.5

109. A 20 mm diameter international metric thread will have a pitch of  
 a. 1 mm                                      b. 1.25 mm  
 c. 1.50 mm                                d. 2.0 mm  
 e. 2.5 mm.\*
110. On a triple thread screw  
 a. lead = pitch  
 b. lead = 3 pitch \*  
 c. lead =  $\frac{1}{2}$  pitch  
 d. lead = 9 pitch  
 e. 9 lead = pitch
111. A 20 mm diameter international metric thread will have a pitch of  
 a. 1 mm  
 b. 1.25 mm  
 c. 1.50 mm  
 d. 2.0 mm  
 e. 2.5 mm \*
112. The change in pitch diameter of a screw thread ( $\delta d$ ) and the pitch error ( $\delta p$ ) are approximately related as under  
 a.  $\delta d \cong \delta p$   
 b.  $\delta p \cong \delta p/2$   
 c.  $\delta d \cong 2\delta p$  \*  
 d.  $\delta p \cong 1.5 \delta p$   
 e.  $\delta p \cong 3 \delta p$

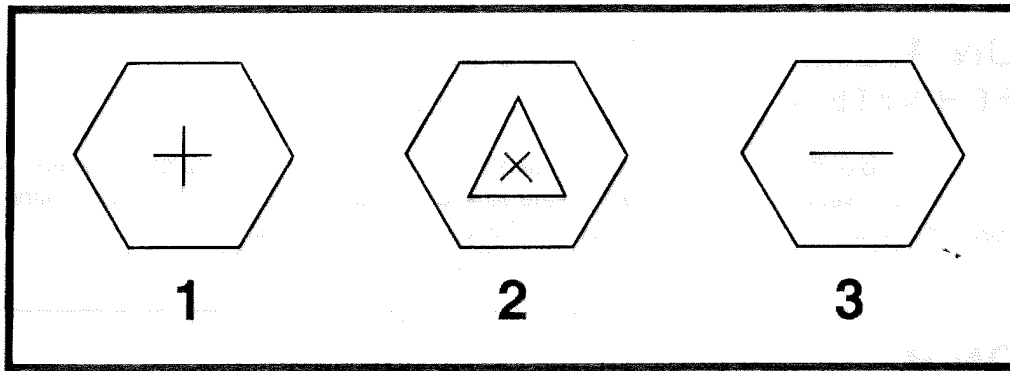


Fig. 2.6 Aircraft Hardware.

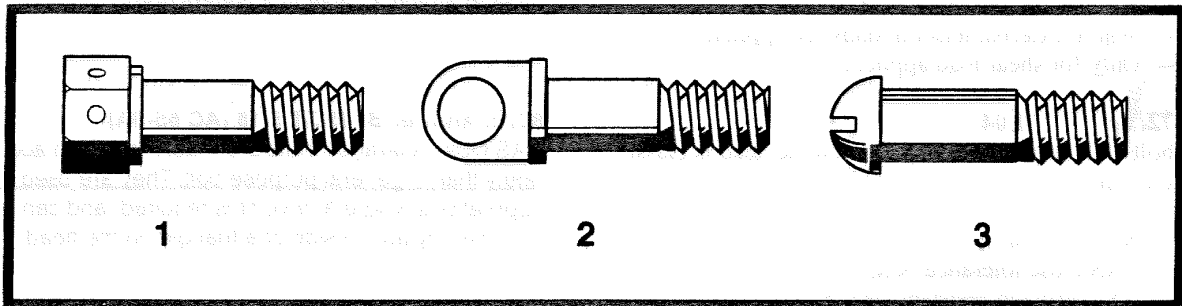


Fig. 2.7 Aircraft Hardware.

113. Unless otherwise specified, torque values for tightening aircraft nuts and bolts relate to
- clean, dry threads.\*
  - clean, lightly oiled threads.
  - either dry or lightly oiled threads.
114. Unless otherwise specified or required, aircraft bolts should be installed so that the bolthead is
- upward, or in a forward direction.\*
  - downward, or in a forward direction.
  - downward, or in a rearward direction.
115. A fiber-type, self-locking nut must never be used on an aircraft if the bolt is
- under shear loading.
  - under tension loading.
  - subject to rotation.\*
116. (Refer to fig. 2.6) Which of the bolthead code markings shown identifies a corrosion resistant AN standard steel bolt ?
- 1.
  - 2.
  - 3.\*
117. Aircraft bolts with a cross or asterisk marked on the bolthead are
- made of aluminum alloy.
  - close tolerance bolts.
  - standard steel bolts.\*
118. Which statement regarding bolts is correct ?
- Alloy bolts smaller than 1/4-inch diameter should not be used in primary structure.
  - When tightening castellated nuts on drilled bolts, if the cotter pin holes do not line up, it is permissible to tighten the nut up to 10 percent over recommended torque to permit alignment of the next slot with the cotter pin hole.
  - In general, bolt grip lengths should equal the material thickness.\*
119. Generally speaking, bolt grip lengths should be
- equal to the thickness of the material which is fastened together, plus approximately one diameter.
  - equal to the thickness of the material which is fastened together.\*
  - one and one half times the thickness of the material which is fastened together.
120. Normally elastic stop nuts can be used many times
- with complete safety
  - without detriment to their locking efficiency
  - both a & b \*
  - none of these
121. (Refer to figure 2.7) Identify the clevis bolt illustrated.
- 1.
  - 3.\*
  - 2.

122. A particular component is attached to the aircraft structure by the use of an aircraft bolt and a castellated tension nut combination. If the cotter pin hole does not align within the recommended torque range, the acceptable practice is to
- exceed the torque range.
  - tighten below the torque range.
  - change washers and try again.\*
123. A bolt with a single raised dash on the head is classified as an
- AN corrosion-resistant steel bolt.\*
  - NAS standard aircraft bolt.
  - NAS close tolerance bolt.
124. How is a clevis bolt used with a fork-end cable terminal secured ?
- With a shear nut tightened to a snug fit, but with no strain imposed on the fork and safetied with a cotter pin.\*
  - With a castle nut tightened until slight binding occurs between the fork and the fitting to which it is being attached.
  - With a shear nut and cotter pin or a thin self-locking nut tightened enough to prevent rotation of the bolt in the fork.
125. Where is an AN clevis bolt used in an airplane ?
- For tension and shear load conditions.
  - Where external tension loads are applied.
  - Only for shear load applications.\*
126. A bolt with an x inside a triangle on the head is classified as an
- NAS standard aircraft bolt.
  - NAS close tolerance bolt.\*
  - AN corrosion-resistant steel bolt.
127. Aircraft bolts are usually manufactured with a
- class 1 fit for the threads.
  - class 2 fit for the threads.
  - class 3 fit for the threads.\*
128. How is the locking feature of the fibre-type lock nut obtained ?
- By the use of an unthreaded fibre locking insert.\*
  - By a fibre insert held firmly in place at the base of the load carrying section.
  - By making the threads in the fibre insert slightly smaller than those in the load carrying section.
129. Which maintenance record entry best describes the action taken for a control cable showing approximately 20 percent wear on several of the individual outer wires at a fairlead ?
- Wear within acceptable limits, repair not necessary.\*
  - Remove and replace the control cable and rerig the system.
  - Cable repositioned, worn area moved away from fairlead.
130. A well designed rivet joint will subject the rivets to
- compressive loads.
  - tension loads.
  - shear loads.\*
131. A main difference between Lockbolt/Huckbolt tension and shear fasteners (other than their application ) is in the
- method of installation.
  - number of locking collar grooves.\*
  - shape of the head.
132. Alloy 2117 rivets are heat treated
- to a temperature of 910 to 930 °F and quenched in cold water.
  - by the manufacturer and do not require heat treatment before being driven.\*
  - by the manufacturer but require reheat treatment before being driven.
133. The general rule for finding the proper rivet diameter is
- three times the thickness of the thickest sheet.\*
  - two times the rivet length.
  - three times the thickness of the materials to be joined.
134. The shop head of a rivet should be
- one and one-half times the diameter of the rivet shank.\*
  - one and one-half times the diameter of the manufactured head of the rivet.
  - one-half times the diameter of the rivet shank.
135. One of the main advantages of Hi-Lok type fasteners over earlier generations is that
- the squeezed on collar installation provides a more secure, tighter fit.
  - they can be removed and reused again.
  - they can be installed with ordinary hand tools.\*
136. The marking on the head of a Dzus fastener identify the
- manufacturer and type of material.
  - body type, head diameter, and type of material.
  - body diameter, type of head, and length of the fastener.\*
137. The Dzus turnlock fastener consists of a stud, grommet, and receptacle. The stud length is measured in
- sixteenths of an inch.
  - tenths of an inch.
  - hundredths of an inch.\*
138. The Dzus turnlock fastener consists of a stud, grommet, and receptacle. The stud diameter is measured in
- sixteenths of an inch.\*
  - hundredths of an inch.
  - tenths of an inch.

139. Threaded rivets (Rivnuts) are commonly used to
- join two or more pieces of sheet metal where shear strength is desired.
  - join two or more pieces of sheet metal where bearing strength is desired.
  - attach parts or components with screws to sheet metal.\*
140. Cherrymax and Olympic-Lok rivets
- may be installed with ordinary hand tools.
  - utilize a pulling tool for installation.\*
  - utilize a rivet gun, special rivet set, and bucking bar for installation.
141. Hole filling fasteners (for example, MS20470 rivets) should not be used in composite structures primarily because of the
- possibility of causing delamination.\*
  - difficulty in forming a proper shop head.
  - increased possibility of fretting corrosion in the fastener.
142. Metal fasteners used with carbon/graphite composite structures
- must be constructed of high strength aluminum lithium alloy.
  - must be constructed of material such as titanium or corrosion resistant steel.\*
  - may be constructed of any of the metals commonly used in aircraft fasteners.
143. If a new safety belt is to be installed in an aircraft, the belt must conform to the strength requirements in which document?
- TSO C22.\*
  - FAR Part 39.
  - STC 1282.
144. Select the alternative which best describes the function of the flute section of a twist drill.
- Forms the cutting edges of the drill point.
  - Forms the area where the drill bit attaches to the drill motor.
  - Prevents overheating of the drill point.\*
145. Self locking nuts are
- boots self locking nut
  - stainless steel self locking nuts
  - both a & b \*
  - none of these
146. Shallow scratches in sheet metal may be repaired by
- buffing.
  - burnishing.\*
  - stop drilling.
147. What should be the included angle of a twist drill for soft metals?
- 118°.
  - 90°.\*
  - 65°.
148. When comparing the machining techniques for stainless steel sheet material to those for aluminum alloy sheet, it is normally considered good practice to drill the stainless steel at a
- higher speed with less pressure applied to the drill.
  - lower speed with less pressure applied to the drill.
  - lower speed with more pressure applied to the drill.\*
149. A single lap sheet splice is to be used to repair a section of damaged aluminum skin. If a double row of 1/8-inch rivets is used, the minimum allowable overlap will be
- 3/4 inch.
  - 13/16 inch.\*
  - 1/2 inch.
150. Which statement is true regarding the inspection of a stressed skin metal wing assembly known to have been critically loaded?
- If rivets show no visible distortion, further investigation is unnecessary.
  - If genuine rivet tipping has occurred, groups of consecutive rivet heads will be tipped in the same direction.\*
  - If bearing failure has occurred, the rivet shanks will be joggled.
151. What is the minimum edge distance for aircraft rivets?
- Three times the diameter of the rivet shank.
  - Two times the diameter of the rivet head.
  - Two times the diameter of the rivet shank.\*
152. When drilling stainless steel, the drill used should have an included angle of
- 140° and turn at a low speed.\*
  - 118° and turn at a high speed.
  - 90° and turn at a low speed.
153. What is the minimum spacing for a single row of aircraft rivets?
- Three times the length of the rivet shank.
  - Three times the diameter of the rivet shank.\*
  - Two times the diameter of the rivet shank.
154. (Refer to figure 2.8.) Which of the rivets shown will accurately fit the conical depression made by a 100° countersink?
- 3.
  - 2.
  - 1.\*
155. Which is correct concerning the use of a file?
- A smoother finish can be obtained by using a double cut file than by using a single cut file.
  - Apply pressure on the forward stroke, only, except when filing very soft metals such as lead or aluminum.\*
  - The terms “double cut” and “second cut” have the same meaning in reference to files.

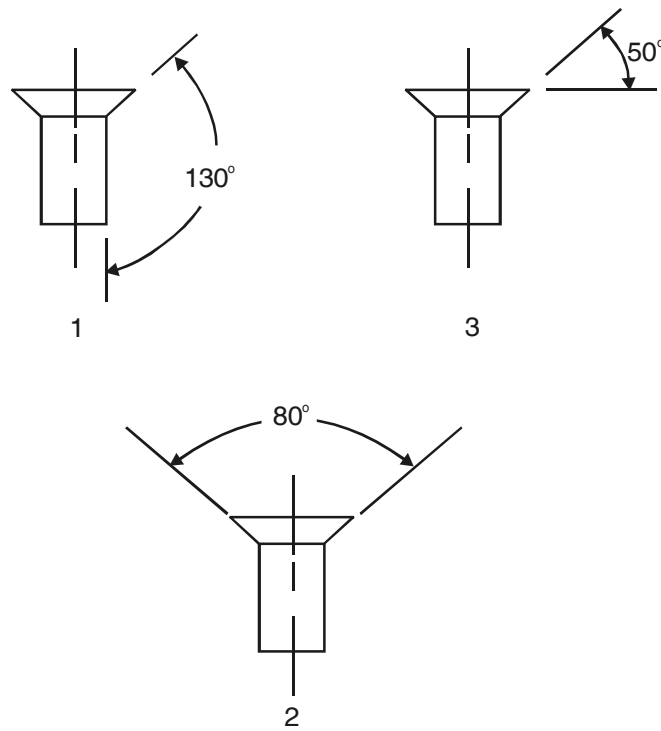
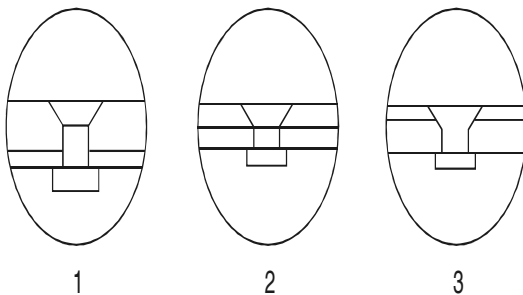


Figure 2.8

156. What is one of the determining factors which permits machine countersinking when flush riveting?
  - a. Thickness of the material and rivet diameter are the same.
  - b. Thickness of the material is greater than the thickness of the rivet head.\*
  - c. Thickness of the material is less than the thickness of the rivet head.
157. When repairing a small hole on a metal stressed skin, the major consideration in the design of the patch should be
  - a. that the bond between the patch and the skin is sufficient to prevent dissimilar metal corrosion.
  - b. the shear strength of the riveted joint.\*
  - c. to use rivet spacing similar to a seam in the skin.
158. Which procedure is correct when using a reamer to finish a drilled hole to the correct size?
  - a. Turn the reamer only in the cutting direction.\*
  - b. Apply considerable pressure on the reamer when starting the cut and reduce the pressure when finishing the cut.
  - c. Turn the reamer in the cutting direction when enlarging the hole and the opposite direction to remove from the hole.
159. Repairs or splices involving stringers on the lower surface of stressed skin metal wings are usually
  - a. permitted only if the damage does not exceed 6 inches in any direction.
  - b. not permitted.
  - c. permitted but are normally more critical in reference to strength in tension than similar repairs to the upper surface.\*
160. When straightening members made of 2024-T4, you should
  - a. straighten cold and anneal to remove stress.
  - b. straighten cold and reinforce.\*
  - c. apply heat to the inside of the bend.
161. Clad aluminum alloys are used in aircraft because they
  - a. are stronger than unclad aluminum alloys.
  - b. are less subject to corrosion than uncoated aluminum alloys.\*
  - c. can be heat treated much easier than the other forms of aluminum.
162. Aircraft structural units, such as spars, engine supports, etc., which have been built up from sheet metal, are normally
  - a. repairable, using approved methods.\*
  - b. not repairable, but must be replaced when damaged or deteriorated.
  - c. repairable, except when subjected to compressive loads.
163. A factor which determines the minimum space between rivets is the
  - a. diameter of the rivets being used.\*
  - b. length of the rivets being used.
  - c. thickness of the material being riveted.
164. What should be the included angle of a twist drill for hard metal?
  - a. 118°.\*
  - b. 90°.
  - c. 100°.

165. When fabricating parts from Alclad 2024-T3 aluminum sheet stock.
- bends should be made with a small radius to develop maximum strength.
  - all bends must be  $90^\circ$  to the grain.
  - all scratches, kinks, tool marks, nicks, etc., must be held to a minimum.\*
166. Rivet gauge, or transverse pitch is the distance between the
- heads of rivets in the same row.
  - centers of rivets in adjacent rows.\*
  - centers of adjacent rivets in the same row.
167. Rivet pitch is the distance between the
- centers of adjacent rivets in the same row.\*
  - heads of rivets in the same row.
  - centers of rivets in adjacent rows.
168. (Refer to figure 2.9) Select the preferred drawing for proper countersinking.
- 2.
  - 1.\*
  - All are acceptable.
171. When an MS20470D rivet is installed, its full shear strength is obtained
- by the cold working of the rivet metal in forming a shop head.
  - only after a period of age hardening.\*
  - by heat treating just prior to being driven.
172. Which of the following need not be considered when determining minimum rivet spacing?
- Rivet length.\*
  - Type of material being riveted.
  - Rivet diameter.
173. What is the purpose of refrigerating 2017 and 2024 aluminum alloy rivets after heat treatment?
- To retard age hardening.\*
  - To relieve internal stresses.
  - To accelerate age hardening.
174. Under certain conditions, type A rivets are not used because of their
- low strength characteristics.\*
  - tendency toward embrittlement when subjected to vibration.
  - high alloy content.



**Figure .2.9.**

169. What is indicated by a black “smoky” residue streaming back from some of the rivets on an aircraft?
- Fretting corrosion is occurring between the rivets and the skin.\*
  - Exfoliation corrosion is occurring inside the structure.
  - The rivets were excessively work hardened during installation.
170. The identifying marks on the heads of aluminum alloy rivets indicate the
- degree of dimensional and process control observed during manufacture.
  - specific alloy used in the manufacture of the rivets.\*
  - head shape, shank size, material used, and specifications adhered to during manufacture.
175. A rivet set used to drive MS20470 rivets should
- be nearly flat on the end, with a slight radius on the edge to prevent damage to the sheet being riveted.
  - have a slightly greater radius than the rivet head.\*
  - have the same radius as the rivet head.
176. Heat treated rivets in the D and DD series that are not driven within the prescribed time after heat treatment or removal from refrigeration
- may be returned to refrigeration and used later without reheat treatment.
  - must be reheat treated before use.\*
  - must be discarded.
177. The dimensions of an MS20430AD-4-8 rivet are
- 1/8 inch in diameter and 1/2 inch long.\*
  - 1/8 inch in diameter and 1/4 inch long.
  - 4/16 inch in diameter and 8/32 inch long.

- 178. The primary alloying agent of 2024-T36 is indicated by the number
  - a. 20.
  - b. 24.
  - c. 2.\*
- 179. Which part of the 2017-T36 aluminum alloy designation indicates the primary alloying agent used in its manufacture?
  - a. 20.
  - b. 17.
  - c. 2.\*
- 180. A sheet metal repair is to be made using two pieces of 0.040-inch aluminum riveted together. All rivet holes are drilled for 3/32-inch rivets. The length of the rivets to be used will be
  - a. 5/16 inch.
  - b. 1/4 inch.\*
  - c. 1/8 inch.
- 181. Most rivets used in aircraft construction have
  - a. a raised dot.
  - b. smooth heads without markings.
  - c. dimples.\*
- 182. MS20426 AD-6-5 indicates a countersunk rivet which has
  - a. an overall length of 5/16 inch.\*
  - b. a shank length 5/16 inch (excluding head).
  - c. a shank length of 5/32 inch (excluding head).
- 183. Which rivet may be used as received without further treatment?
  - a. 2117-T3.\*
  - b. 2017-T3.
  - c. 2024-T4.
- 184. (Refer to figure 2.10.) Which is the grip length of the flush rivet?
  - a. 2 \*
  - b. 3
  - c. 1
- 185. Which rivets should be selected to join two sheets of .032-inch aluminum?
  - a. MS20455DD-5.3.
  - b. MS20425D-4-3.
  - c. MS20470AD-4-4.\*
- 186. A sheet metal repair is to be made using two pieces of 0.0625-inch aluminum riveted together. All rivet holes are drilled for 1/8-inch rivets. The length of the rivets to be used will be
  - a. 5/16 inch.\*
  - b. 3/16 inch.
  - c. 5/32 inch.
- 187. Mild steel rivets are used for riveting
  - a. nickel steel parts.
  - b. magnesium parts.
  - c. steel parts. \*
- 188. A DD rivet is heat treated before use to
  - a. soften to facilitate riveting.\*
  - b. harden and increase strength.
  - c. relieve internal stresses.
- 189. When riveting dissimilar metals together, what precautions must be taken to prevent an electrolytic action?
  - a. Avoid the use of dissimilar metals by redesigning the unit according to the recommendations outlined in AC 43.13-1A.
  - b. Treat the surfaces to be riveted together with a process called anodic treatment.
  - c. Place a protective separator between areas of potential electrical difference.\*
- 190. The length of a rivet to be used to join a sheet of .032-inch and .064-inch aluminum alloy should be equal to
  - a. one and one half times the rivet diameter plus .096 inch.\*
  - b. three times the rivet diameter plus .096 inch.
  - c. two times the rivet diameter plus .064 inch.

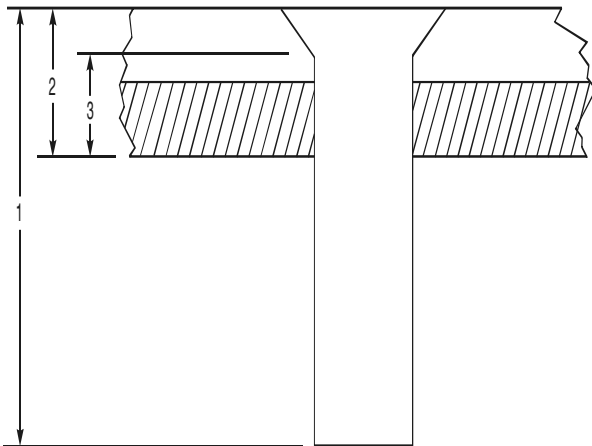


Figure 2.10.

191. What is generally the best procedure to use when removing a solid shank rivet?  
 a. Drill to the base of the manufactured rivet head with a drill one size smaller than the rivet shank and remove the rivet with a punch.\*  
 b. Drill through the manufactured head and shank with a drill one size smaller than the rivet and remove the rivet with a punch.  
 c. Drill through the manufactured head and shank with a shank size drill and remove the rivet with a punch.
192. Joggles in removed rivet shanks would indicate partial  
 a. bearing failure.                      b. torsion failure.  
 c. shear failure.\*
193. What type of loads cause the most rivet failures?  
 a. Shear.\*                                  b. Head.  
 c. Bearing.
194. Which rivet is used for riveting magnesium alloy structures?  
 a. 5056 aluminum.\*                      b. Monel.  
 c. Mild steel.
195. Which rivet is used for riveting nickel steel alloys?  
 a. Mild steel.                                b. Monel.\*  
 c. 2024 aluminum.
196. The length of rivet to be chosen when making a structural repair that involves the joining of 0.032-inch and 0.064-inch aluminum sheet, drilled with a No. 30 drill, is  
 a. 1/4 inch.                                  b. 7/16 inch.  
 c. 5/16 inch.\*
197. (Refer to figure 2.11). The length of flat A is  
 a. 3.875 inches.                            b. 3.937 inches.  
 c. 3.750 inches.\*

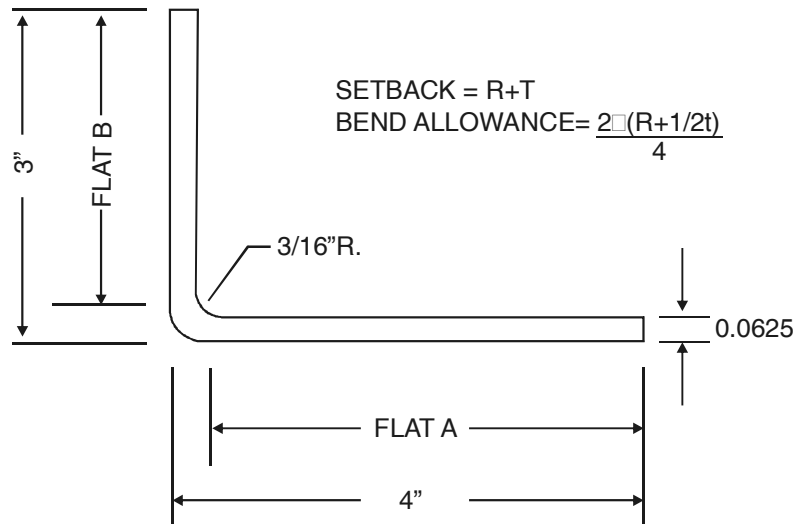


Figure 2.11

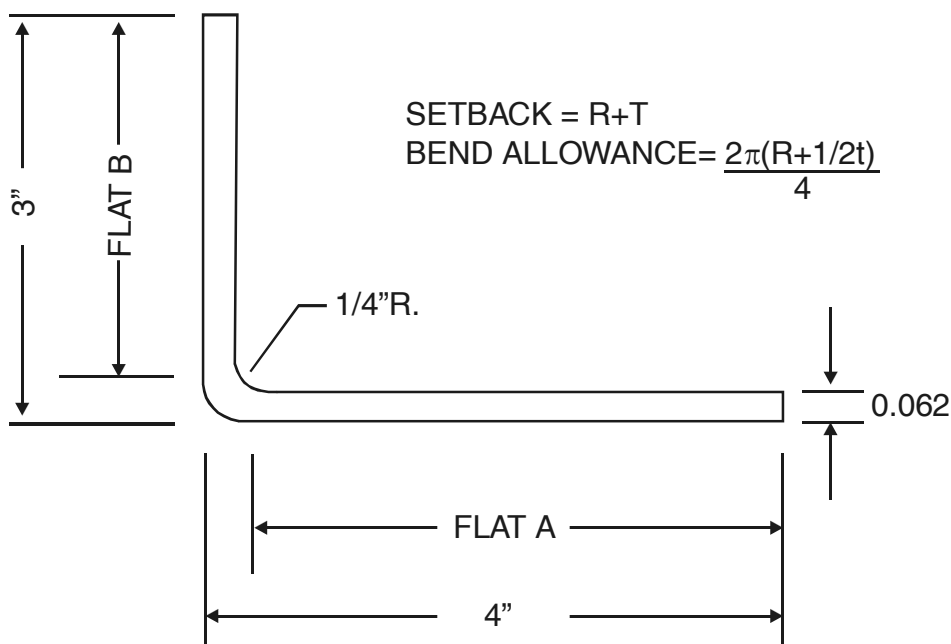


Figure 2.12



198. (Refer to Figure 2.11). The amount of material required to make the 90° bend is  
 a. 0.3717 inch.                                    b. 0.3925 inch.  
 c. 0.3436 inch.\*
199. (Refer to figure 2.12.) What is the length of flat A?  
 a. 3.9 inches.                                    b. 3.7 inches.\*  
 c. 3.8 inches.
200. (Refer to figure 2.12) What is the flat layout dimension?  
 a. 6.6 inches.                                    b. 7.0 inches.  
 c. 6.8 inches.\*
201. If a streamline cover plate is to be hand formed using a form block, a piece of dead soft aluminum should first be placed over the hollow portion of the mould and securely fastened in place. The bumping operation should be  
 a. started by tapping the aluminum lightly around the edges and gradually working down into the center.\*  
 b. distributed evenly over the face of the aluminum at all times rather than being started at the edges or center.  
 c. started by tapping the aluminum in the center until it touches the bottom of the mold and then working out in all directions.
202. A piece of flat stock that is to be bent to a closed angle of 15° must be bent through an angle of  
 a. 165°\*                                    b. 105°.  
 c. 90°.
203. When a piece of aluminum alloy is to be bent using a minimum radius for the type and thickness of material.  
 a. less pressure than usual should be applied with the movable (upper) clamping bar.  
 b. the layout should be made so that the bend will be 90° to the grain of the sheet.\*  
 c. the piece should be bent slowly to eliminate cracking.
204. The flat layout or blank length of a piece of metal from which a simple L shaped bracket 3 inches by 1 inch is to be bent depends upon the radius of the desired bend. The bracket which will require the greatest amount of material is one which has a bend radius of  
 a. 1/2 inch.  
 b. 1/4 inch.  
 c. 1/8 inch.\*
205. If it is necessary to compute a bend allowance problem and bend allowance tables are not available, the neutral axis of the bend can be  
 a. found by adding approximately one half of the stock thickness to the bend radius.\*  
 b. represented by the actual length of the required material for the bend.  
 c. found by subtracting the stock thickness from the bend radius.
206. Unless otherwise specified, the radius of a bend is the  
 a. radius of the neutral axis plus one half the thickness of the metal being formed.  
 b. inside radius of the metal being formed.\*  
 c. inside radius plus one half the thickness of the metal being formed.
207. The sharpest bend that can be placed in a piece of metal without critically weakening the part is called the  
 a. minimum radius of bend.\*  
 b. bend allowance.  
 c. maximum radius of bend.
208. The most important factors needed to make a flat pattern layout are  
 a. radius, thickness, and mould line.  
 b. the lengths of the legs (flat sections).  
 c. radius, thickness, and degree of bend.\*
209. A piece of sheet metal is bent to a certain radius. The curvature of the bend is referred to as the  
 a. bend radius.\*  
 b. bend allowance.  
 c. neutral line.
210. You can distinguish between aluminum and aluminum alloy by  
 a. testing with a 10 percent solution of caustic soda.\*  
 b. filing the metal.  
 c. testing with acetic acid solution.
211. The purpose of a joggle is to  
 a. decrease the weight of the part and still retain the necessary strength.  
 b. increase obstruction for a sheet or an extrusion.  
 c. allow clearance for a sheet or an extrusion.\*
212. When bending metal, the material on the outside of the curve stretches while the material on the inside of the curve compresses. That part of the material which is not affected by either stress is the  
 a. mould line.  
 b. bend tangent line.  
 c. neutral line.\*
213. (Refer to figure 2.13.) Determine the dimensions of A, B, and C in the flat layout. Setback = .252 Bend allowance = .345  
 a. A = 1.252  
     B = 2.504  
     C = 1.752  
 b. A = .748  
     B = 2.252  
     C = 2.004.  
 c. A = .748 \*  
     B = 1.496  
     C = 1.248.

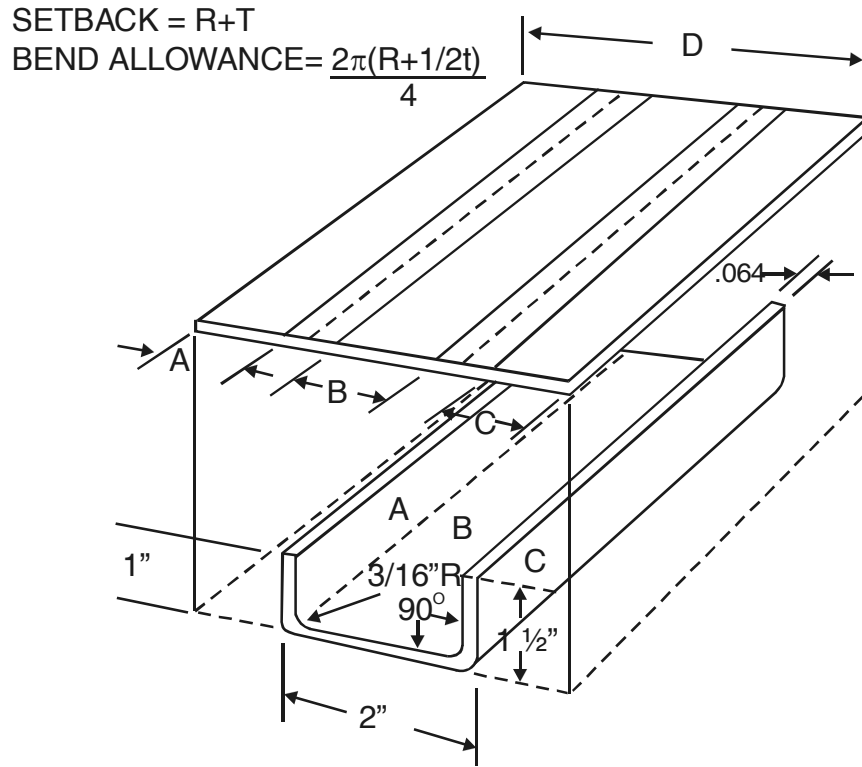


Figure 2.13

214. (Refer to figure 2.13.) What is dimension D?

Setback = .252  
 Bend allowance = .345

- a. 3.841.
- b. 3.492.
- c. 4.182.\*

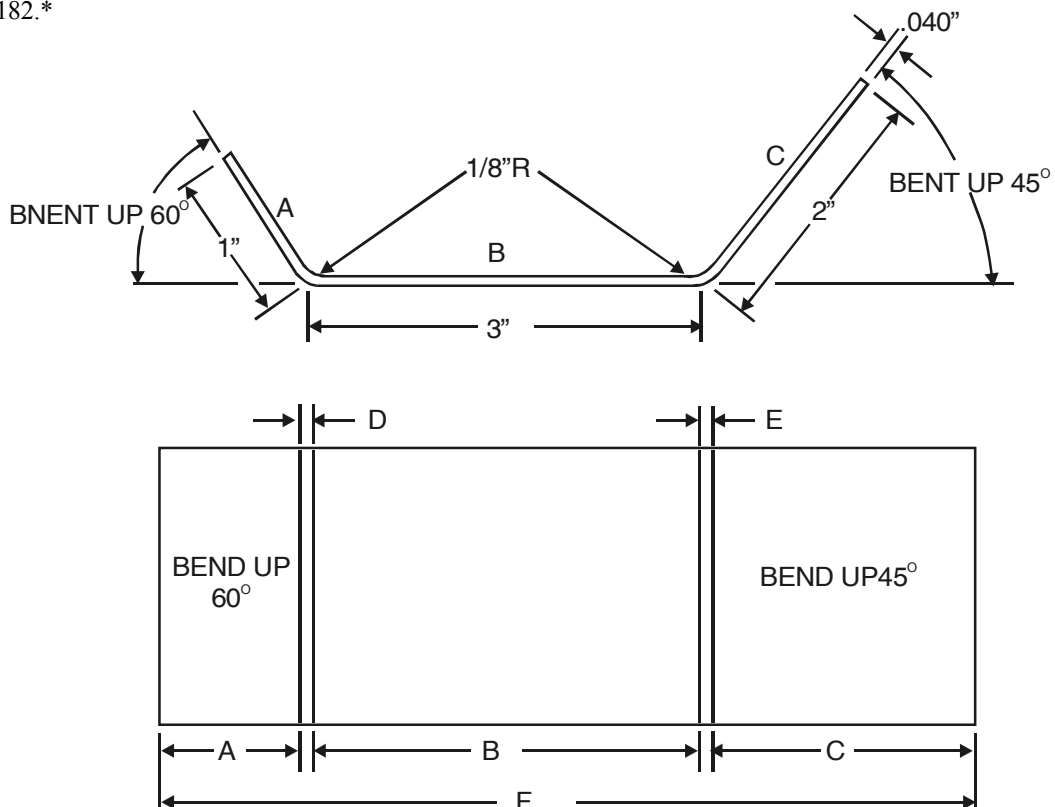


Figure 2.14

215. The sight line on a sheet metal flat layout to be bent in a cornice or box brake is measured and marked
- one radius from either bend tangent line.
  - one-half radius from either bend tangent line.
  - one radius from the bend tangent line that is placed under the brake.\*
216. (Refer to figure 2.14) What is dimension F?  
 Setback at D = .095  
 Setback at E = .068  
 Bend allowance at D = .150  
 Bend allowance at E = .112
- 4.836.
  - 5.738.
  - 5.936.\*
217. On a sheet metal fitting layout with a single bend, allow for stretching by
- adding the setback to each leg.
  - subtracting the setback from one legs.
  - subtracting the setback from both legs.\*
218. The aluminum alloys used in aircraft construction are usually hardened by which method?
- Heat treatment.\*
  - Aging.
  - Cold working.
219. The cylindrical portion of rivets is called
- Shank
  - body
  - tail
  - both 'a' or 'b' \*
220. Lower portion of shank is known as
- tail \*
  - body
  - both of above
  - none of these
221. Rivets are used to make
- permanent fastening \*
  - temporary fastening
  - detachable fastenings
  - none of these
222. Examples of permanent fastenings are
- brazed
  - welding
  - riveted joints
  - all of these \*
223. Examples of temporary fastenings are
- keys
  - cottor
  - splined joints
  - all of these \*
224. The material of rivets must be
- ductile
  - tough
  - both of above \*
  - none of these
225. The rivets may be made by
- cold heading
  - hot forging
  - both of above \*
  - none of these
226. The function of rivets in a joint is
- to make a connection strength & tightness
  - tightness is necessary in order to contribute to strength
  - to prevent leakage as in a boiler or in a ship hull
  - all of these \*
227. In structural and pressure vessel riveting, the diameter of riveted hole is usually
- 1.5 mm larger than nominal diameter of rivet \*
  - 2.5 mm larger than nominal diameter of rivet
  - 2mm larger than nominal diameter of rivet
  - none of these
228. The cold riveting process is used for
- structural joints \*
  - leak proof joint
  - both of above
  - none of these
229. Hot riveting is used to make
- leak proof joints \*
  - structural joints
  - both of above
  - none of these
230. The snap heads are usually employed for
- structural work
  - machine riveting
  - both of above \*
  - none of these
231. The counter sunk heads are mainly used for
- ship building \*
  - structural work
  - both of above
  - none of these
232. Which heads have maximum strength
- snap heads
  - pan heads \*
  - both of above
  - none of these
233. In order to make the joints leak proof or fluid tight in pressure vessels like steam boilers, known as
- caulking \*
  - sealing
  - both of above
  - none of these
234. A screw made by cutting a single helical groove on cylinder is known as
- single threaded \*
  - double threaded
  - triple threaded
  - none of these
235. A srewed joint is mainly composed of
- Nut
  - bolt
  - both of above \*
  - none of the above
236. To relieve fastenings of bending stressess. The devices used are
- use of clearance spaces
  - spherical seat washers
  - both of the above \*
  - none of these
237. A round bar threaded at both ends, known as
- studs \*
  - tap bolt
  - cap screws
  - none of the above

238. The cap screws with the head slotted for a screw driver is known as  
 a. machine screws \*      b. set screws  
 c. studs                      d. none of the above
239. Set screws are used to prevent  
 a. relative motion b/w the two parts \*  
 b. leakage  
 c. both of above  
 d. none of these
240. Locking devices are  
 a. jam or lock nut              b. castle nut  
 c. sawn nut                      d. all of the above \*
241. Jam, lock nut or check nut thickness is  
 a.  $\frac{1}{2}$  to  $\frac{2}{3}$  thickness of standard nut \*  
 b. 1 to 2 times thickness of standard nut  
 c.  $\frac{2}{3}$  to 1 times thickness of standard nut  
 d. none of these
242. The nuts extensively used on jobs subjected to sudden shocks and considerable vibration such as automobile is  
 a. sawn nut                      b. castle nut \*  
 c. jam or lock nut              d. none of these
243. A rivet is specified by  
 a. shank diameter \*              b. length of rivet  
 c. length of tail  
 d. none of above
244. The edges of boiler plates are bevelled to an angle of  
 a.  $20^\circ$                               b.  $40^\circ$   
 c.  $60^\circ$                               d.  $80^\circ$  \*
245. A screw is specified by its  
 a. major diameter \*              b. minor diameter  
 c. pitch diameter  
 d. none of the above
246. The included angle for acme threads is  
 a.  $29^\circ$  \*                              b.  $55^\circ$   
 c.  $47.5^\circ$                               d.  $60^\circ$
247. The railway carriage couplings have  
 a. square threads              b. acme threads  
 c. knuckle threads              d. buttress thread \*
248. The rivets which are most commonly used in aircraft construction is  
 a. solid shank rivets \*              b. sawn rivet  
 c. both of above              d. none of these
249. Aircraft term used to describe the  
 a. various types of fasteners  
 b. miscellaneous small items used in manufacture & repair of aircraft  
 c. both of above \*  
 d. none of these
250. Universal rivet sets can be identified with  
 a. tool number                      b. size of rivet  
 c. both of above \*              d. none of these
251. Flush rivet sets can be identified by  
 a. tool number \*                      b. size of rivet  
 c. both of these                      d. none of these
252. The height of bucked head should be  
 a. 1.5 times the rivet diameter  
 b. 0.5 times the rivet diameter \*  
 c. 2.5 times the rivet diameter  
 d. none of above
253. The width of bucked head should be  
 a. 1.5 times the rivet diameter \*  
 b. 0.5 times the rivet diameter  
 c. 2.5 times the rivet diameter  
 d. none of these
254. The types of fastening devices are  
 a. bolts                              b. screws  
 c. both of these \*              d. none of these
255. Bolts are used where deciding factor is  
 a. strength \*                              b. not strength  
 c. rigidity                              d. none of these
256. Non self-locking nuts contain external locking devices such as  
 a. cotter pin  
 b. safety wire or locknuts  
 c. both of these \*  
 d. none of these
257. Self-locking nuts contain  
 a. Elastic stop nut \*              b. floating nut  
 c. spline nut                              d. none of these
258. In coding of nuts 'P' indicates  
 a. ordinary nut \*                      b. slotted nut  
 c. castle nut                              d. thin nut
259. In coding of nuts 'S' indicates  
 a. ordinary nut                              b. slotted nut \*  
 c. castle nut                              d. thin nut
260. In coding of nuts 'C' indicates  
 a. ordinary nut                              b. slotted nut  
 c. thin nut                              d. castle nut \*
261. In coding of nuts 'T' indicates  
 a. ordinary nut                              b. slotted nut  
 c. thin nut \*                              d. castle nut
262. The bolt part number "AN3DD5A", the 'AN' designates  
 a. Airforce - Navy standard bolt \*  
 b. American standard bolt  
 c. British standard bolt  
 d. none of these

263. The Bolt part Number 'AN3DD5A', DD represents
- The material is 2024 Aluminum alloy \*
  - Diameter of bolt
  - corrosion resistant steel
  - all of these
264. The letter "C" in place of "DD" would indicate
- The material is 2024 copper Alloy
  - corrosion resistant steel \*
  - both of above
  - none of these
265. Bolts inspected by
- Magnetic flux
  - fluorescent means (zyglo)
  - either a or b \*
  - none of these
266. The special purpose bolts are
- eye bolts
  - clevis bolts
  - lock bolts
  - all of these \*
267. Clevis bolts are used where loads present is/are
- shear load \*
  - tension
  - both of these
  - none of these
268. Lock bolt is generally used in
- wing splice fittings
  - landing gear fittings
  - fuel cell fittings
  - all of these \*
269. In numbering systems of lock bolts "ALPPT88", "ALLP" indicates
- Head type as pan head \*
  - pin materials
  - class fit
  - none of these
270. In lock bolt collar - "LCCB", "LC" indicates
- lock bolt collar \*
  - material
  - both of above
  - none of these
271. Eye bolts are used when the type of load is
- shear loads
  - external tension \*
  - both of these
  - none of these
272. In stump type lock bolt - "ALSF E 8 8", "ALSF" indicates
- pin material
  - flat head type \*
  - both of these
  - none of these
273. In Blind type lock bolt, 'BL 84', 'BL' indicates
- strump type lock bolt
  - blind lock bolt \*
  - head type
  - all of these
274. The plain hex nut, AN 315 and AN 335 is suitable for carrying large
- shear loads
  - tensional loads \*
  - bending loads
  - none of these
275. Non self locking nuts are
- cotter pins
  - safety wire
  - lock nuts
  - all of these \*
276. Non-self locking type of nuts are
- castle nut
  - plain hex nut
  - plain check nut
  - all of these \*
277. The wing nut, AN350 is intended for use where
- high shear load is desired
  - desired tightness can be obtained with fingers \*
  - locking is desired
  - none of these
278. Common applications of self locking nuts are
- attachment of antifriction bearings & control pulleys
  - attachment of rocker box covers and exhaust stacks
  - attachment of accessories, anchor nuts around inspection holes and small tank installation openings
  - all of the above \*
279. In nut code number AN310D5R
- 'AN310' represents aircraft castle nut
  - 'D' represents 2024-T aluminum alloy
  - '5' - represents 5/16 inch diameter
  - 'R' - represents right hand thread
- The correct options are -
- 1 & 2
  - 1, 2 & 3
  - 1, 3 & 4
  - All four options \*
280. In code number of nut 'AN320-10'
- The correct options are
- AN320 - aircraft castellated shear nut, cadmium plated carbon steel
  - 10 = 5/8 inch diameter, 18 threads per inch
- only 1
  - only 2
  - both 1 & 2 \*
  - none of these
281. In code number of nut -'AN350B1032'
- AN350 = aircraft wingnut
  - B = Brass
  - 10 = number 10 bolt
  - 32 = threads per inch
- The correct options are :
- All the 1, 2, 3 & 4 \*
  - 1 & 2
  - 1, 2 & 3
  - 1, 3 & 4



## CHAPTER - 3

# DETAILED KNOWLEDGE OF THE INTERPRETATION OF ENGINEERING DRAWINGS INCLUDING SYMBOLS

1. (1) A detail drawing is a description of single part.  
(2) An assembly drawing is a description of an object made up of two or more parts.  
Regarding the above statements,
  - a. only No. 1 is true.
  - b. neither No. 1 nor No. 2 is true.
  - c. both No. 1 and No. 2 are true.\*
2. (Refer to figure 3.1) Identify the bottom view of the object shown.
  - a. 1.
  - b. 2.\*
  - c. 3.
6. (1) Schematic diagrams indicate the location of individual components in the aircraft.  
(2) Schematic diagrams indicate the location of components with respect to each other within the system.  
Regarding the above statements,
  - a. only No. 1 is true.
  - b. both No. 1 and No. 2 are true.
  - c. only No. 2 is true.\*

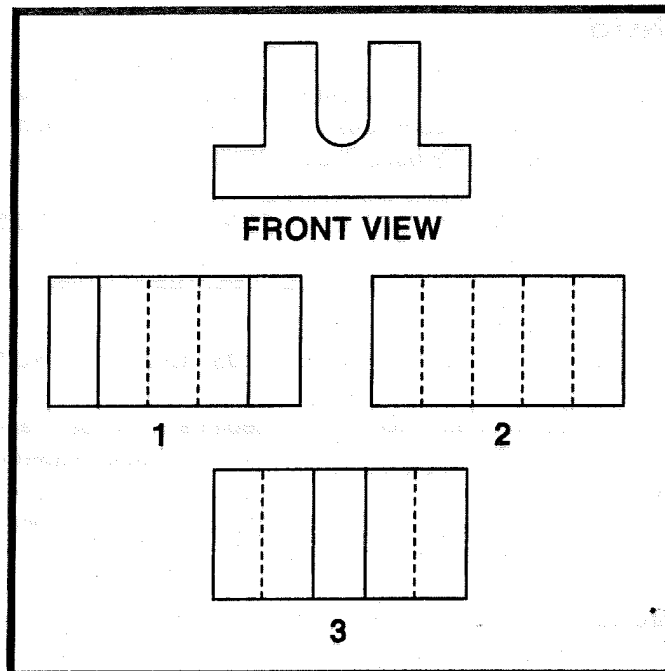


Fig. 3.1. Object Views.

3. Which statement is true regarding an orthographic projection?
  - a. There are always at least two views.
  - b. It could have as many as eight views.
  - c. One-view, two-view, and three-view drawings are the most common.\*
4. (Refer to figure 3.2) Identify the left side view of the object shown.
  - a. 1.
  - b. 2.
  - c. 3.\*
5. (Refer to figure 3.3 Identify the bottom view of the object.
  - a. 1.\*
  - b. 2.
  - c. 3.
7. For sketching purpose, almost all objects are composed of one or some combination of six basic shapes; these include the
  - a. angle, arc, line, plane, square and circle.
  - b. triangle, circle, cube, cylinder, cone and sphere.\*
  - c. triangle, plane, arc, line, square and polygon.
8. Working drawings may be divided into three classes. They are :
  - a. title drawings, installation drawings and assembly drawings.
  - b. detail drawings, assembly drawings and installation drawings.\*
  - c. orthographic projection drawings, pictorial drawings and detail drawings.

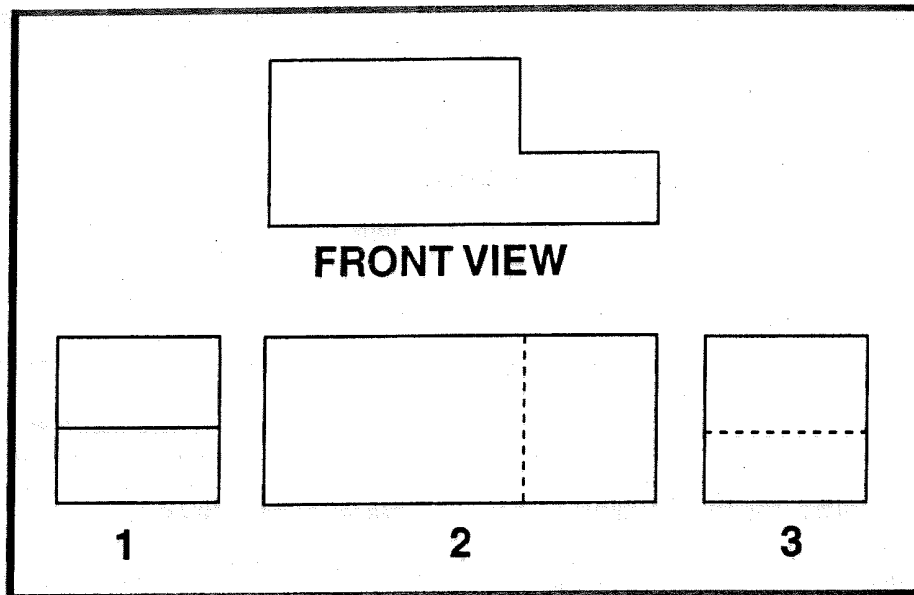


Fig.3.2. Object Views.

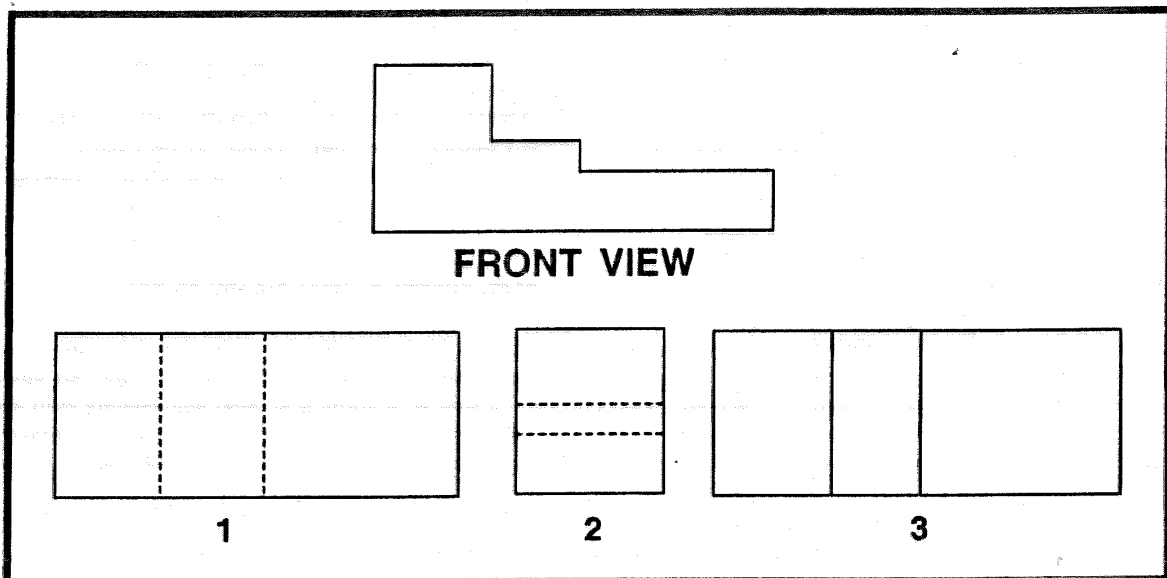


Fig. 3.3 Object Views.

9. One purpose for schematic diagrams is to show the
  - a. functional location of components within a system \*
  - b. physical location of components within a system.
  - c. size and shape of components within a system.
10. A hydraulic system schematic drawing would indicate the
  - a. specific location of the individual components within the aircraft.
  - b. direction of fluid flow through the system.\*
  - c. type and quantity of the hydraulic fluid.
11. (1) A measurement should not be scaled from an aircraft print because the paper shrinks or stretches when the print is made.
  - (2) When a detail drawing is made, it is carefully and accurately drawn to scale, and is dimensioned.
 Regarding the above statements,
  - a. only No. 2 is true.
  - b. both No. 1 and No. 2 are true.\*
  - c. neither No. 1 nor No. 2 is true.
12. The drawing often used in illustrated parts manuals are
  - a. exploded view drawings.\*
  - b. block drawings.
  - c. detail drawings.

- 13. A drawing in which the subassemblies or parts are shown as brought together on the aircraft is called
  - a. a sectional drawing.
  - b. a detail drawing.
  - c. an installation drawing.\*
- 14. What type of diagram shows the wire size required for a particular installation ?
  - a. A block diagram.
  - b. A schematic diagram.
  - c. A wiring diagram.\*
- 15. What type of diagram is used to explain a principle of operation, rather than shown the parts as they actually appear ?
  - a. A pictorial diagram.
  - b. A schematic diagram.\*
  - c. A block diagram.
- 16. (Refer to figure 3.4, 3.4A & 3.4B as necessary) Which doubler(s) require(s) heat treatment before installation?
  - a. -101.
  - b. -102.\*
  - c. Both.
- 17. (Refer to figure 3.4, 3.4A & 3.4B, as necessary) Using only the information given (when bend allowance, set back, etc., have bend allowance, set back, etc., have been calculated) which doubler is it possible to construct and install ?
  - a. -101\*.
  - b. -102.
  - c. Both.
- 18. (Refer to figure 3.4) The -100 in the title block (Area 1) is applicable to which doubler part number(s)?
  - a. -101.\*
  - b. -102.
  - c. Both.
- 19. What type of line is normally used in a mechanical drawing or blueprint to represent an edge or object not visible to the viewer ?
  - a. Medium-weight dashes line.\*
  - b. Medium solid line.
  - c. Alternate short and long light dashes.
- 20. (Refer to figure 3.5) In the isometric view of a typical aileron balance weight, identify the view indicated by the arrow
  - a. 1.
  - b. 3.\*
  - c. 2.
- 21. A specific measured distance from the datum or some other point identified by the manufacturer, to a point in or on the aircraft is called a
  - a. zone number.
  - b. specification number.
  - c. station number.\*

Area 1		4	4	MS20470AD-4-4	RIVET				REV.	B
		8	8	NAS1097-3-4	RIVET					
		4	4	NAS1473-3A	DOMED NUTPLATE					
		5	5	NAS1097-4-5	RIVET					
		37	37	NAS1097-4-4	RIVET					
		2	2	-103	CLIP	.040 SHEET	2024-T3 CLAD AL.			
		1		-102	DOUBLER	.040 SHEET	7075-0 AL.			
			1	-101	DOUBLER	.040 SHEET	2024-T3 CLAD AL.			
		PART NUMBER		NAME	STOCK SIZE	MAT'L DESCR		MAT'L SPEC	ZONE	

		-200	-100	DASH NUMBERS SHOWN	DASH NUMBERS OPPOSITE	UNIT WT.	DWG. AREA	
				ALL	N/A	FIRST	RELEASE	
REQ'D PER ASSEM.				UNLESS OTHERWISE NOTED	FOR CONTINUATION SEE ZONE			
						PROJECT	T. BOSS	
						DESIGN	D.R. EAMER	
						ENGINEER	G. WHIZ	
						DWG CHECKER	U. WRIGHT	
B ADD -200				SCALE FULL	NO REQ PER AIRPLANE	DFTSMN.	S. LINE	
A MAT'L THKNSS BY DATE APPR.					TYPE A/C	EFF.		
		<b>992-148-XXX</b>						
1 The use of this document shall be restricted to conveyance of information to customers or vendors only. Neither classified nor unclassified documents may be reproduced without the written consent of THE SPEEDWIND AIRCRAFT CORP.		SPEEDWIND AIRCRAFT ENGINEERING SECTION LAST CHANCE AIRPORT NOWHERE OH 44333-0787					<i>T. Boss</i> <i>D. Eamer</i> <i>G. Whiz</i> <i>U. Wright</i> <i>S. Line</i>  7-AH	

Fig-3.4: Part 1 of 3. Maintenance Data.



<div> <p><b>Area 2</b></p> </div> <div> <p><b>GENERAL NOTES - 100</b></p> </div> <div> <ol style="list-style-type: none"> <li>1. All bends +/- .5'</li> <li>2. All holes +/- .003.</li> <li>3. Apply Alodine 1000.</li> <li>4. Prime with MIL-P-23377 or equivalent.</li> <li>5. Trim S-1 C just aft of the clip at STA. 355.750 and forward of the front face of the STA. 370.25 frame and remove from the airplane.</li> <li>6. Position the -101 doubler as shown. Install wet with NAS1097AD-4-4 and -4-5 rivets and a faying surface seal of PR 1422. Pick up the rivet row that was in S-1 C and the aft rivets in STA 370.25. Tie doubler into front frame with clips as shown using MS20470AD-4-4 rivets through the clips and the frame.</li> <li>7. Install 4 NAS1473-3A nutplates with NAS1097-3-4 rivets through the skin and doubler to retain the antenna.</li> <li>8. Strip paint and primer from under the antenna footprint.</li> <li>9. Treat skin with Alodine 1000.</li> <li>10. Install antenna and apply weather seal fillet around antenna base.</li> </ol> </div> <div> <p><b>Area 3</b></p> </div> <div> <p><b>GENERAL NOTES - 200</b></p> </div> <div> <p>Note: P. S. = Process Specification IAW = in accordance with</p> </div> <div> <ol style="list-style-type: none"> <li>1. All bends IAW P. S. 1000.</li> <li>2. All holes IAW P. S. 1015.</li> <li>3. Heat treat -102 to -T6 IAW P. S. 5602.</li> <li>4. Alodine IAW P. S. 10000.</li> <li>5. Prime IAW P. S. 10125.</li> <li>6. Trim S-1 C just aft of the clip at STA. 355.750 and forward of the front face of the STA. 370.25 frame and remove from the airplane.</li> <li>7. Position the -102 doubler as shown. Install wet with NAS1097AD-4-4 and -4-5 rivets, and a faying surface seal IAW P. S. of 41255. Pick up the rivet row that was in S-1 C and the aft rivets in STA 370.25. Add two edge rows as shown. Tie doubler into front frame with clips as shown using MS20470AD-4-4 rivets through the clips and the frame.</li> <li>8. Install 4 NAS1473-3A nutplates with NAS1097-3-4 rivets through the skin and doubler to retain the antenna.</li> <li>9. Strip paint and primer from under the antenna footprint.</li> <li>10. Treat skin IAW P. S. 10000.</li> <li>11. Install antenna and apply weather seal fillet around antenna base.</li> </ol> </div>
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Fig. 3.4A. Part 2 of 3. Maintenance Data.

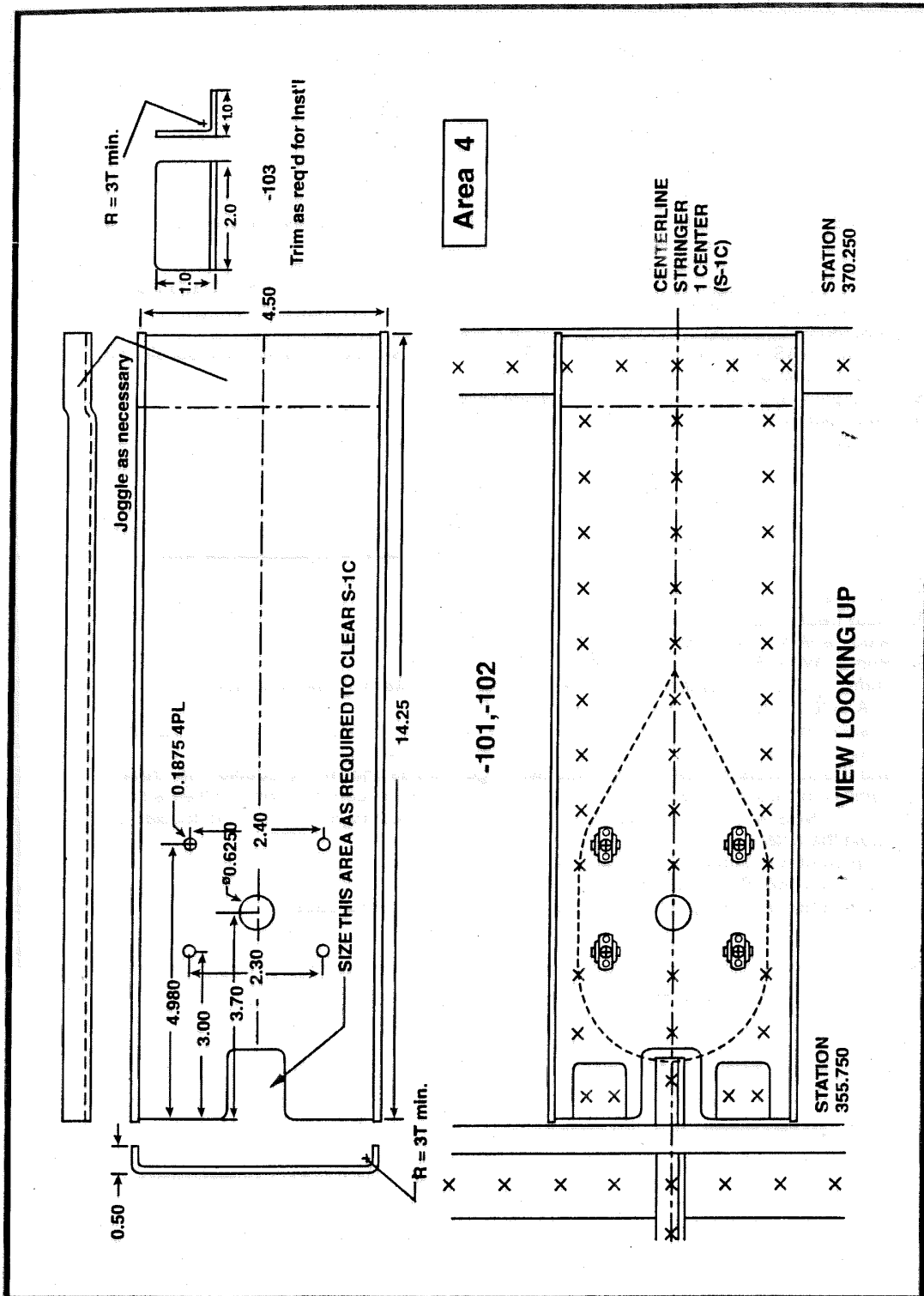


Fig. 3.4B. Maintenance Data.

22. A line used to show an edge which is not visible is a  
 a. phantom line.                      b. hidden line.\*  
 c. break line.
24. Which statement is applicable when using a sketch for making a part?  
 a. The sketch may be used only if supplemented with three-view orthographic projection drawings.

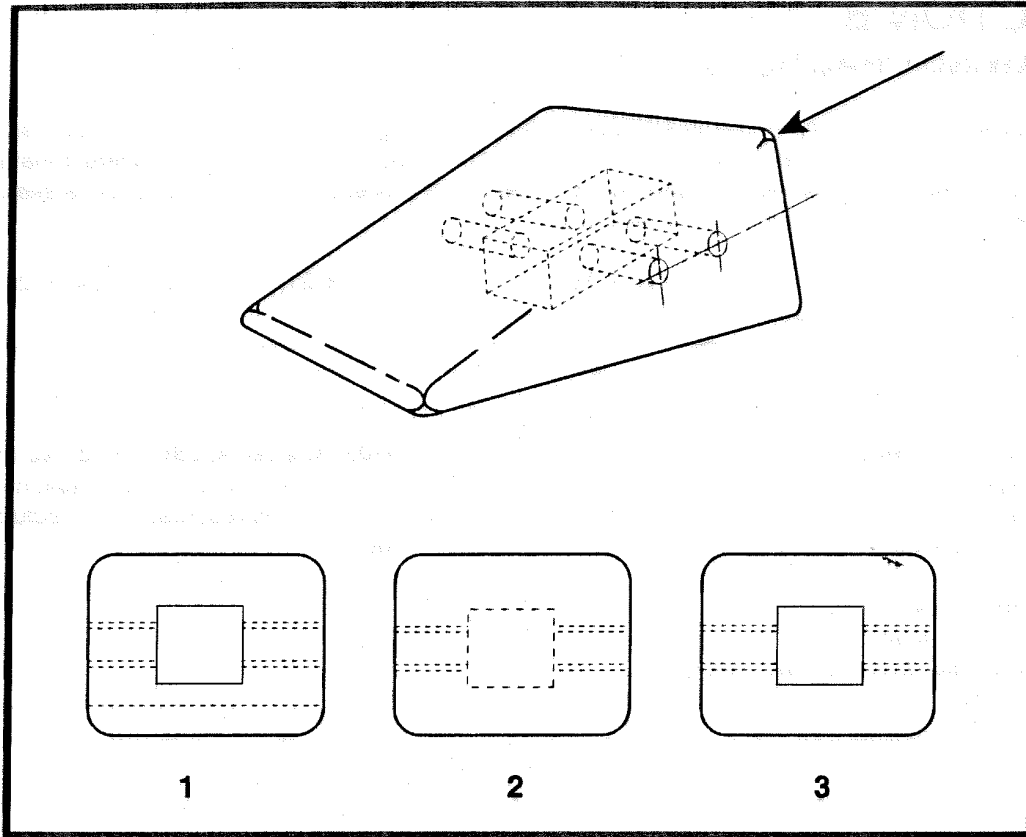


Fig. 3.5. Object Views.

23. (Refer to fig. 3.6) What are the proper procedural steps for sketching repairs and alterations?  
 a. 3, 1, 4, 2.\*                      b. 4, 2, 3, 1.  
 c. 1, 3, 4, 2.
- b. The sketch must show all information to manufacture the part.\*  
 c. The sketch need not show all necessary construction details.

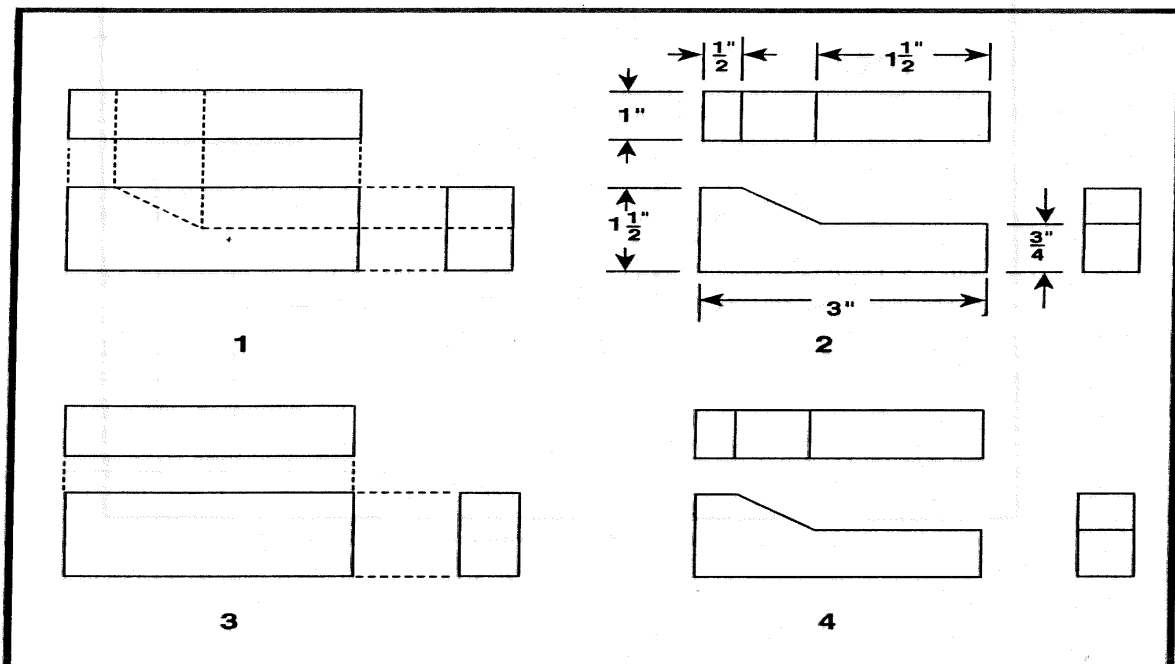


Fig. 3.6. Sketches.

25. (Refer to figure 3.7) What is the next step required for a working sketch of the illustration ?
- Darken the object outlines.
  - Sketch extension and dimension lines.\*
  - Add notes, dimensions, title and date.
26. What should be the first step of the procedure in sketching an aircraft wing skin repair ?
- Draw heavy guidelines.
  - Lay out the repair.
  - Block in the views.\*
29. What material symbol is frequently used in drawings to represent all metals ?
- Steel.
  - Cast iron.\*
  - Aluminium.

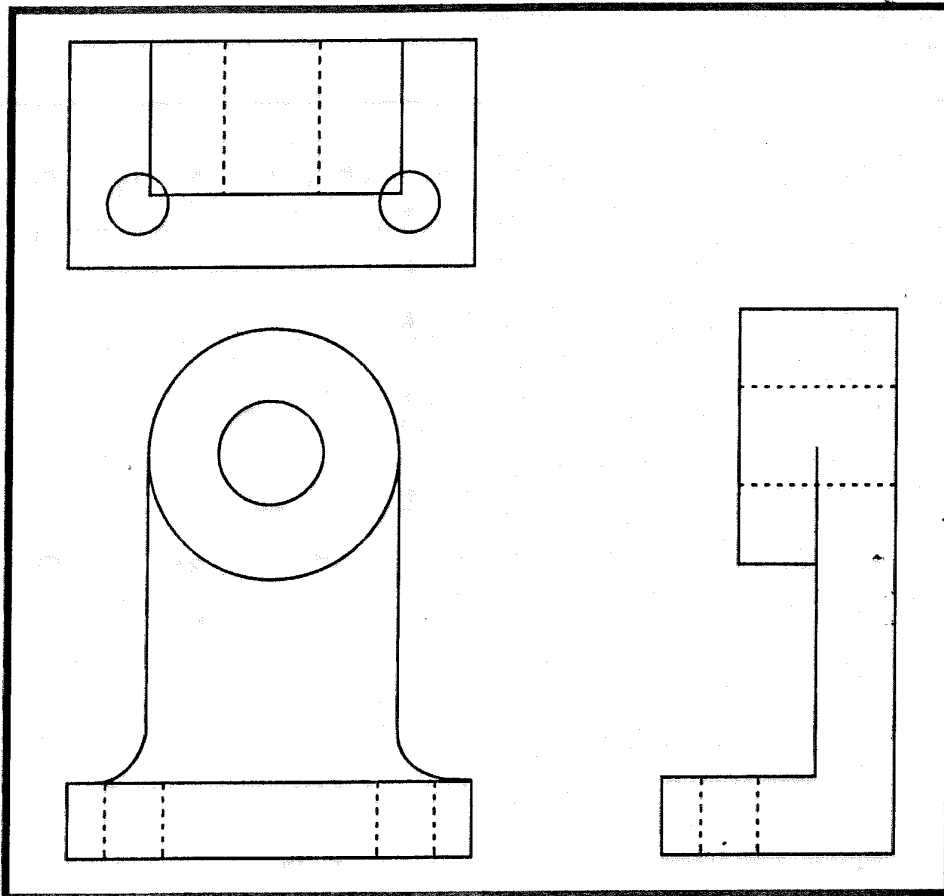


Fig.3.7. Sketches.

27. (1) According to FAR Part 91, repairs to an aircraft skin should have a detailed dimensional sketch included in the permanent records.
- (2) On occasion, a mechanic may need to make a simple sketch of a proposed repair to an aircraft, a new design, or a modification.
- Regarding the above statements,
- only No. 1 is true.
  - only No. 2 is true.\*
  - Both No. 1 and No. 2 are true.
28. Since sketches, by their nature, are drawn without the use of drafting instruments, the layout process is usually made easier by the use of
- graph paper.\*
  - plain white paper.
  - ruled note paper.
30. (Refer to figure 3.8) Which material section-line symbol indicates cast iron ?
- 1.
  - 2.
  - 3.\*
31. (Refer to figure 3.9) What is the dimension of the chamfer?
- $1/16 \times 37^\circ$
  - $0.3125 + .005 - 0$ .
  - $0.0625 \times 45^\circ$  \*
32. (Refer to figure 3.9) What is the maximum diameter of the hole for the clevis pin ?
- 0.3175.\*
  - 0.3130.
  - 0.31255.

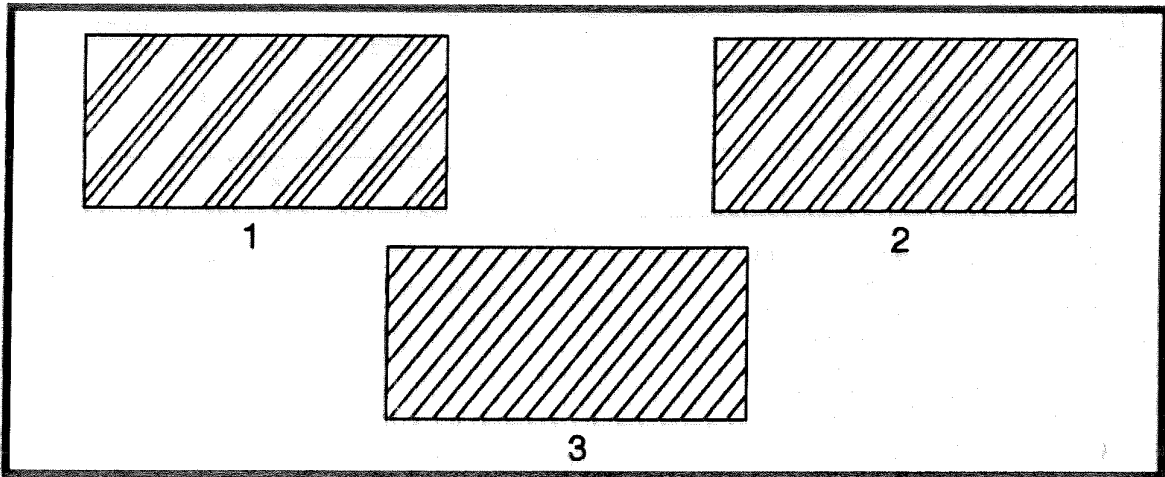


Fig. 3.8. Material Symbols.

33. (Refer to figure 3.9) What would be the minimum diameter of 4130 round stock required for the construction of the clevis that would produce a machined surface ?
- a. 55/64 inch.
  - b. 1 inch. \*
  - c. 7/8 inch.
34. (Refer to figure 3.9) Using the information, what size drill would be required to drill the clevis bolthole ?
- a. 5/16 inch.\*
  - b. 21/64 inch.
  - c. 1/2 inch.

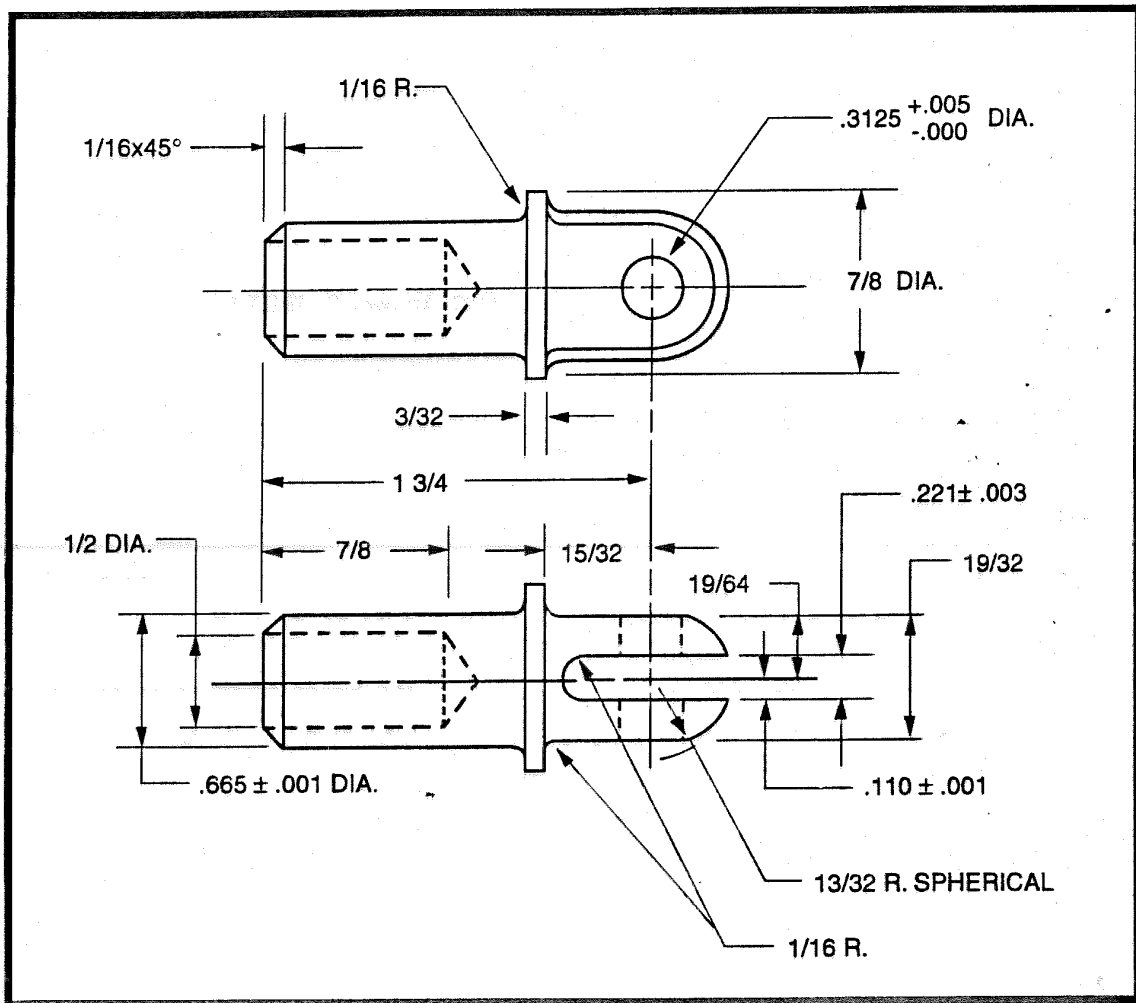


Fig. 3.9. Aircraft Drawing.

35. The measurement showing the ideal or "perfect" sizes of parts on drawings are called
- tolerances.
  - allowances.
  - dimension
36. (Refer to figure 3.10) Identify the extension line.
- 3.\*
  - 1.
  - 4.

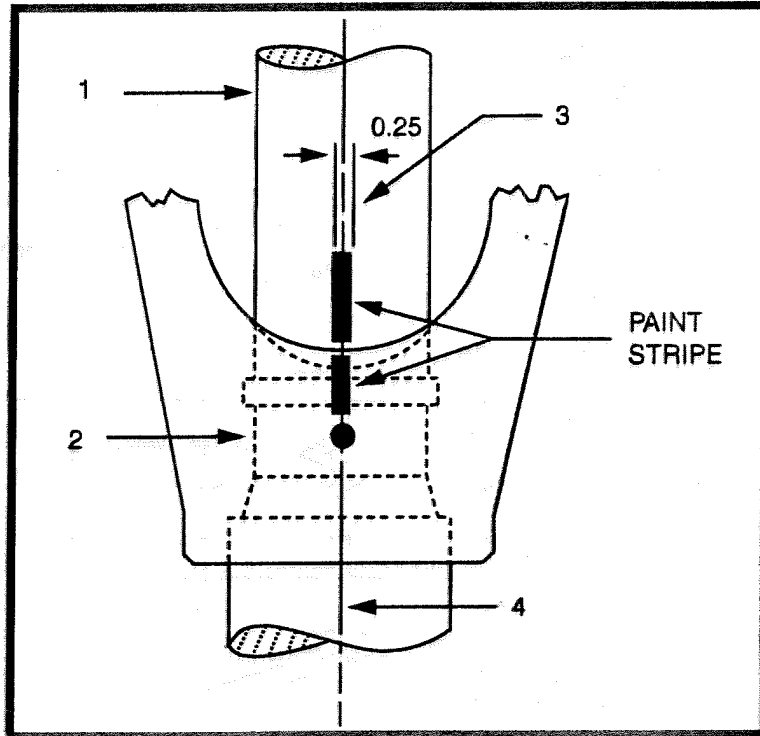


Fig. 3.10. Aircraft Drawing.

37. (Refer to figure 3.11) The diameter of the holes in the finished object is
- 3/4 inch.
  - 31/64 inch.
  - 1/2 inch.\*

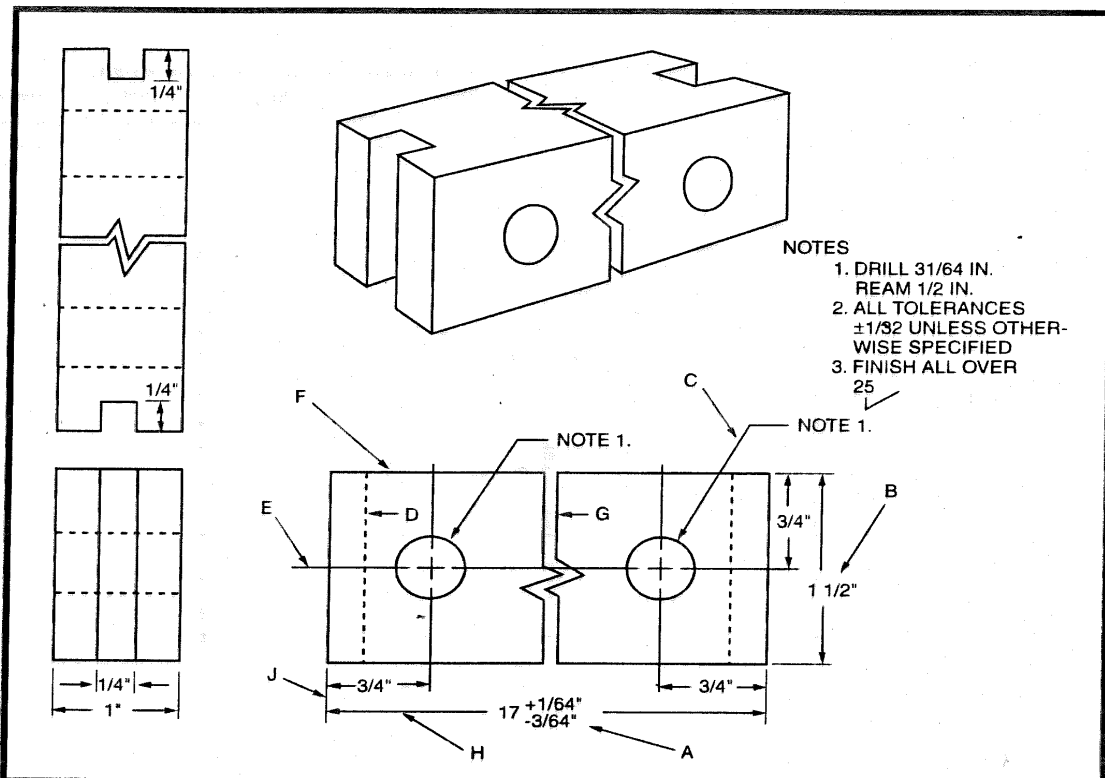


Fig. 3.11. Aircraft Drawing.

38. Zone numbers on aircraft blueprints are used to
  - a. locate parts, sections, and views on large drawings\*.
  - b. indicate different sections of the aircraft.
  - c. locate parts in the aircraft.
39. When reading a blueprint, a dimension is given as 4.387 inches + .005 - .002, which statement is true ?
  - a. The maximum acceptable size is 4.390 inches.
  - b. The minimum acceptable size is 4.385 inches.\*
  - c. The minimum acceptable size is 4.382 inches.
40. What is the allowable manufacturing tolerance for a bushing where the outside dimensions shown on the blueprint are : 1.0625 + .0025 - .0003?
  - a. .0028.\*
  - b. 1.0650.
  - c. 1.0647.
41. (Refer to figure 3.12) The vertical distance between the top of the plate and the bottom of the lowest 15/64-inch hole is
  - a. 2.250.
  - b. 2.242.
  - c. 2.367.\*

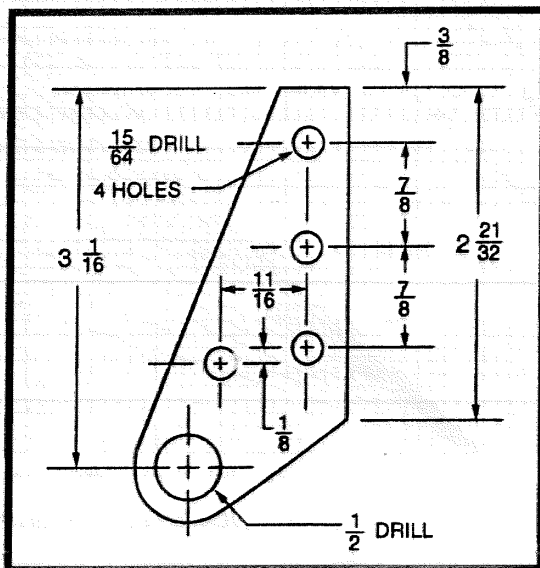


Fig. 3.12. Aircraft Drawing.

42. In the reading of aircraft blueprints, the term "tolerance" used in association with aircraft parts or components,
  - a. is the tightest permissible fit for proper construction and operation of mating parts.
  - b. is the difference between extreme permissible dimensions that a part may have and still be acceptable.\*
  - c. represents the limit of galvanic compatibility between different adjoining material types in aircraft parts.

43. (Refer to figure 3.13) An aircraft reciprocating engine has a 1,830 cubic-inch displacement and develops 1,250 brake-horsepower at 2,500 RPM. What is the brake mean effective pressure ?
  - a. 217.\*
  - b. 205.
  - c. 225.
44. (Refer to figure 3.13) An aircraft reciprocating engine has a 2,800 cubic-inch displacement, develops 2,000 brake-horsepower, and indicates 270 brake mean effective pressure. What is the engine speed (RPM) ?
  - a. 2,200.
  - b. 2,100.\*
  - c. 2,300.
45. (Refer to figure 3.13) An aircraft reciprocating engine has a 2,800 cubic-inch displacement and develops 2,000 brake-horsepower at 2,200 RPM. What is the brake mean effective pressure ?
  - a. 257.5.\*
  - b. 242.5.
  - c. 275.0.
46. (refer to figure 3.14) Determine the cable size of a 40-foot length of single cable in free air, with a continuous rating, running from a bus to the equipment in a 28-volt system with a 15-ampere load and a 1-volt drop.
  - a. No. 10.\*
  - b. No. 11.
  - c. No. 18.
47. (Refer to figure 3.14) Determine the maximum length of a No. 16 cable to be installed from a bus to the equipment in a 28-volt system with a 25-ampere intermittent load and a 1-volt drop.
  - a. 8 feet.\*
  - b. 10 feet.
  - c. 12 feet.
48. (Refer to figure 3.14) Determine the minimum wire size of a single cable in a bundle carrying a continuous current of 20 amperes 10 feet from the bus to the equipment in a 28-volt system with an allowable 1-volt drop.
  - a. No. 12.\*
  - b. No. 14.
  - c. No. 16.
49. (refer to figure 3.14) Determine the maximum length of a No. 12 single cable that can be used between a 28-volt bus and a component utilizing 20 amperes continuous load in free air with a maximum acceptable 1-volt drop.
  - a. 22.5 feet.
  - b. 26.5 feet.\*
  - c. 12.5 feet.
50. (Refer to figure 3.15) Determine the proper tension for a 1/8-inch cable (7 × 19) if the temperature is 80° F.
  - a. 70 pounds.
  - b. 75 pounds.\*
  - c. 80 pounds.

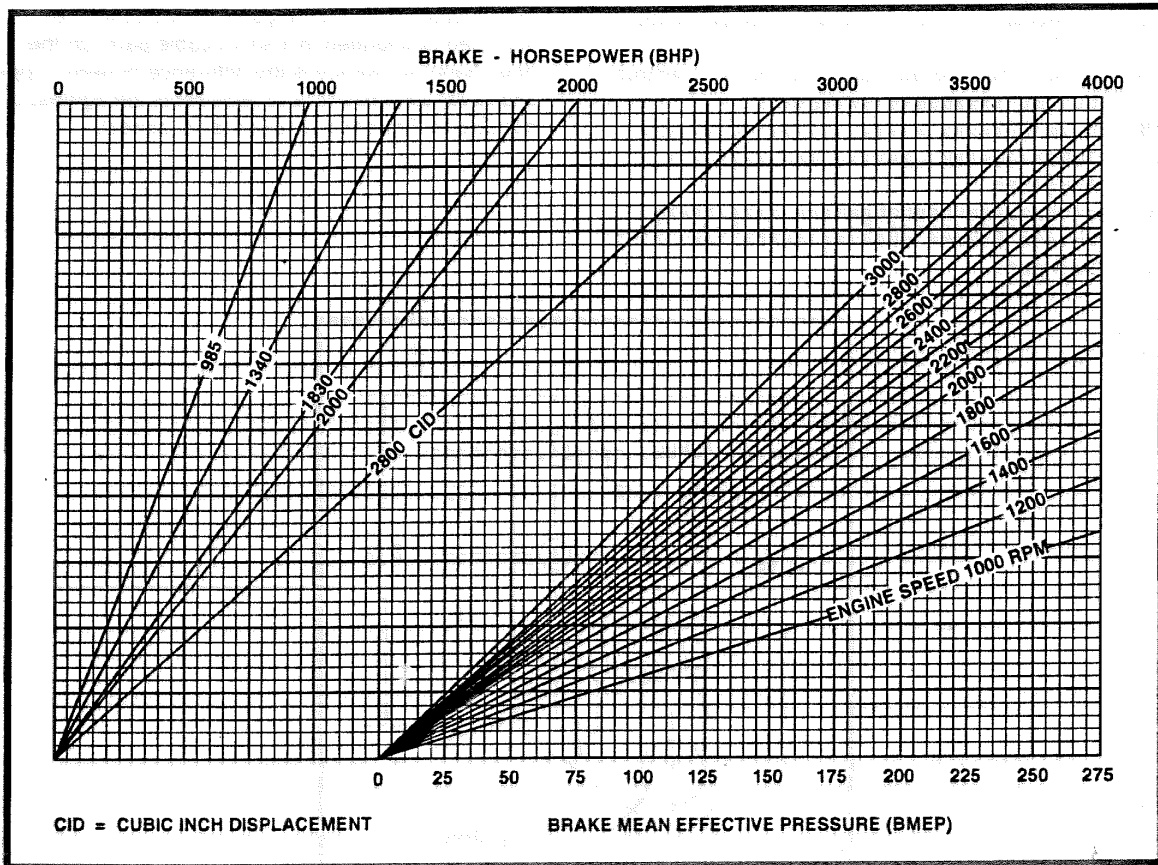


Fig. 3.13. Performance Chart.

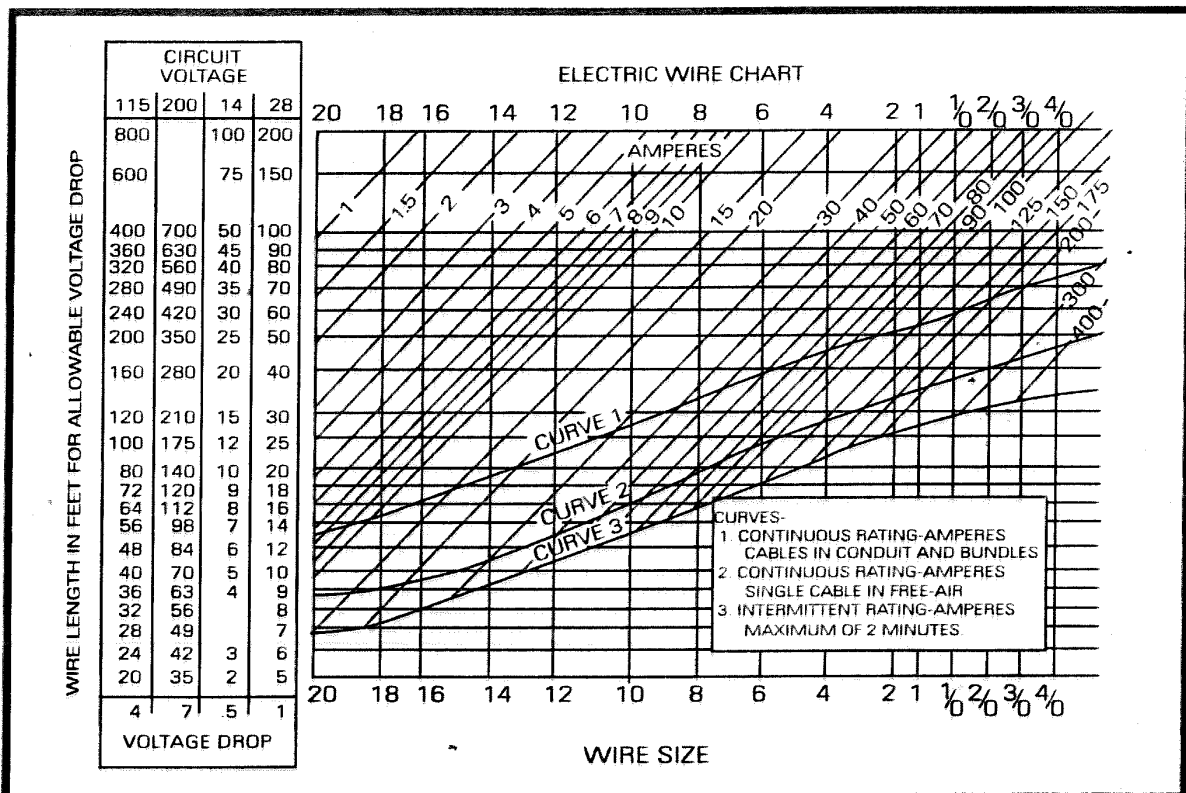


Fig. 3.14. Electric Chart.



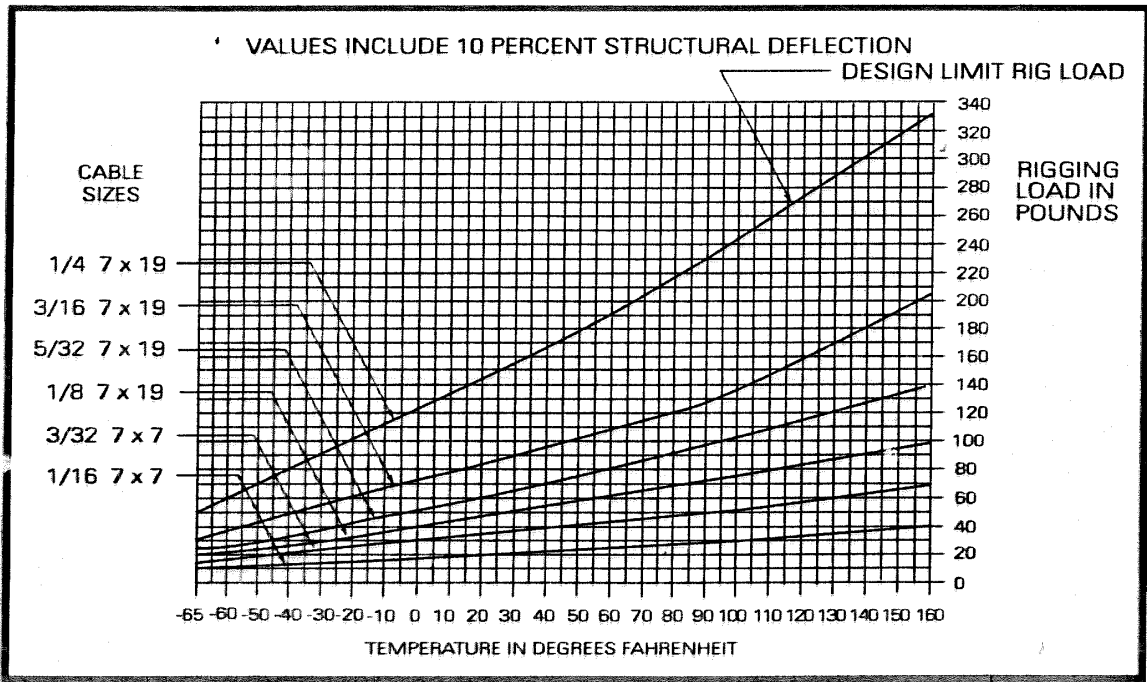


Fig. 3.15. Cable Tension Chart.

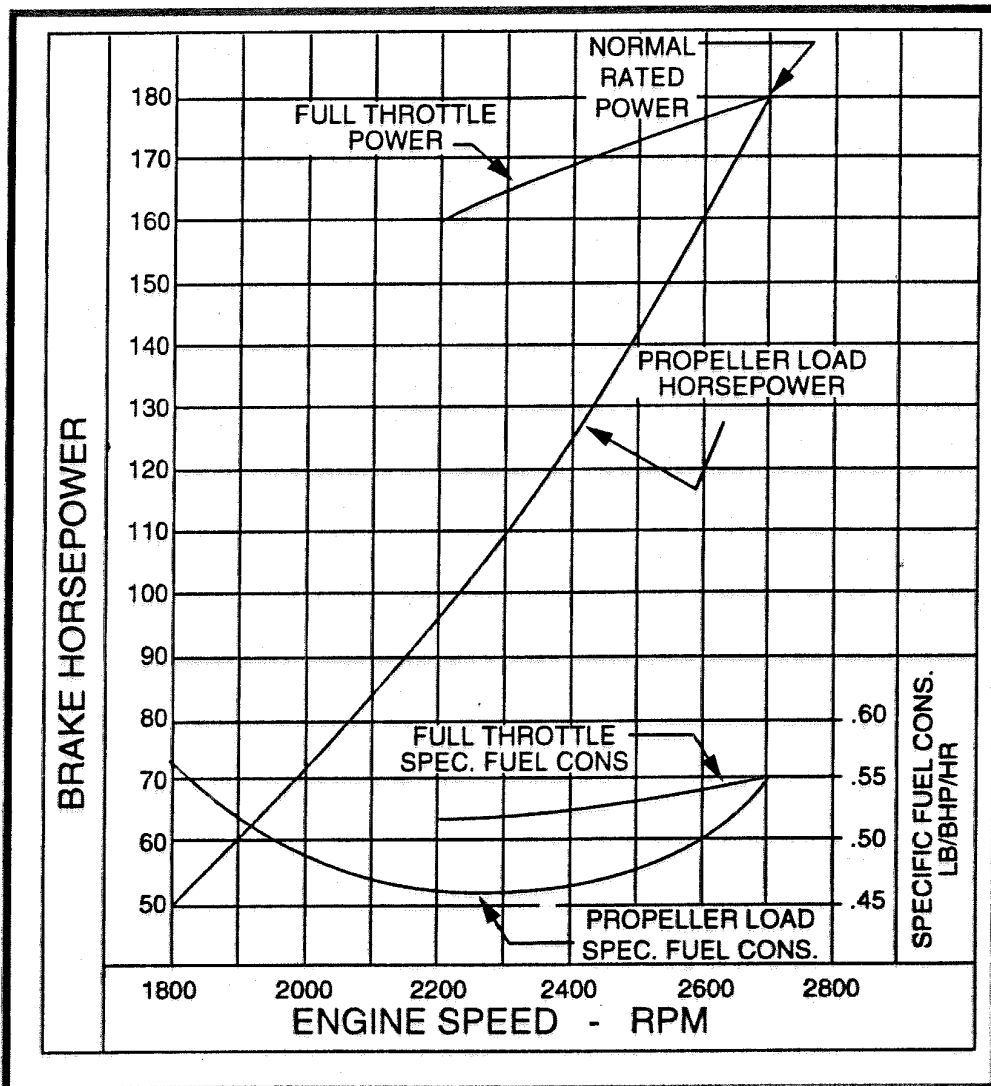



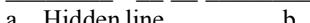
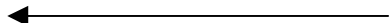


Fig. 3.16. Performance Chart.

51. (Refer to figure 3.15) Determine the proper tension for a 3/16-inch cable (7 × 19 extra flex) if the temperature is 87° F.
- 135 pounds.
  - 125 pounds.\*
  - 140 pounds.
52. (Refer to figure 3.16) Determine how much fuel would be required for a 30-minute reserve operating at 2,300 RPM.
- 25.3 pounds.\*
  - 35.5 pounds.
  - 49.8 pounds.
53. (Refer to figure 3.16) Determine the fuel consumption with the engine operating at cruise, 2,350 RPM.
- 49.2 pounds per hour.
  - 51.2 pounds per hour.
  - 55.3 pounds per hour.\*
54. Detail drawing is a description of
- single part \*
  - double part
  - whole assembly
  - none of these
55. Orthographic projection shows of an object
- four possible views
  - five possible views
  - six possible views \*
  - seven possible views
56. When the projectors are parallel to each other and also perpendicular to the plane, the projection is called
- oblique projection
  - orthographic projection \*
  - isometric projection
  - respective projection
57. The projection on the vertical plane is called
- front view or elevation \*
  - side view
  - top view
  - none of these
58. The projection on the horizontal plane is called
- side view
  - front view or elevation
  - top view \*
  - both (a) & (b)
59. In first angle projection method the object is kept in the
- first quadrant \*
  - second quadrant
  - third quadrant
  - fourth quadrant
60. In third angle projection method the object is kept in the
- first quadrant
  - second quadrant
  - third quadrant \*
  - fourth quadrant
61. Assembly Drawing is a description of an object made up of
- single parts
  - two or more parts \*
  - both (a) and (b)
  - none of these
62. Installation Drawing is a description of an object made up of
- single parts \*
  - double part
  - whole assembly
  - none of these
63. Match the list
- |                     |                     |
|---------------------|---------------------|
| List I              | List II             |
| 1. Detail Drawing   | A. single part      |
| 2. Assembly Drawing | B. two or more part |
| 3. Installation     | C. whole assembly   |
- 1-A, 2-B, 3-C \*
  - 1-B, 2-A, 3-C
  - 1-B, 2-C, 3-A
  - 1-C, 2-A, 3-B
64. Counter sink angle for blind rivets is
- 90°
  - 100°\*
  - 120°
  - 160°
65. The rivet code system has been standardized by the
- national aerospace standards \*
  - indian standards
  - both (a) and (b)
  - none of these
66. The NAS 523 basic rivet symbol consists of two lines crossing at
- 90° \*
  - 100°
  - 110°
  - 120°
67. Section planes are generally
- perpendicular plane \*
  - oblique plane
  - both (a) & (b)
  - none of these
68. Match the list
- |                               |         |
|-------------------------------|---------|
| List I                        | List II |
| 1. counter sink angle         | A 90°   |
| 2. NAS 523 basic rivet symbol | B 100°  |
- 1-A, 2-B
  - both (a) & (b)
  - 1-B, 2-A \*
  - none of these
69. Tetrahedron has the equal faces
- four \*
  - five
  - six
  - sight
70. Cube or hexahedron has the equal faces
- four
  - five
  - six \*
  - none of these

71. Octahedron has the equal faces  
 a. four  
 b. five  
 c. six  
 d. eight \*
72. Dodecahedron has the equal faces  
 a. six  
 b. eight  
 c. twelve \*  
 d. none of these
73. Icosahedron has the equal faces  
 a. eight  
 b. ten  
 c. twelve  
 d. twenty \*
74. The imaginary line joining the centres of the bases is called  
 a. axis \*  
 b. plane  
 c. elevation  
 d. none of these
75. The NAS 1739 E basic rivet symbol at what description of rivet for AAV  
 a. blind, 100° flush \*  
 b. blind protruding head  
 c. both (a) & (b)  
 d. none of these
76. The NAS 1739 M basic rivet symbol at what description of rivet for AAW  
 a. blind, 100° flush \*  
 b. blind protruding head  
 c. both (a) and (b)  
 d. none of these
77. The NAS 1738E basic rivet symbol at what description of rivet for AAR  
 a. bling protruding head \*  
 b. blind 100° flush  
 c. both (a) & (b)  
 d. none of these
78. Match the list  
 List I  
 1.  List II  
 A continuous thin freshand  
 2.  B continuous thin straight  
 with zigzags  
 3.  C Chain thin  
 a. 1-A, 2-B, 3-C \*  
 b. 1-B, 2-A, 3-C  
 c. 1-C, 2-A, 3-B  
 d. 1-A, 2-C, 3-B
79. What this line symbolise :  
  
 a. Hidden line  
 b. Datum line \*  
 c. Stich line  
 d. Phantom line
80. What this line symbolise :  
  
 a. phantom line  
 b. hidden line  
 c. center line  
 d. leader line \*
81. What does Hidden lines indicate  
 a. invisible edges or contours \*  
 b. stitching lines  
 c. sewing lines  
 d. alternate position of parts
82. Phantom lines are composed of  
 a. one long & two short \*  
 b. one long & one short  
 c. two long & one short  
 d. none of the above
83. If a Title Block, has a Notation such as 470208-5LH, then what this 5LH symbolise  
 a. Drawing Number for right hand parts  
 b. 5th sheet of 470208 drawing number sheet, applicable for left hand part \*  
 c. 5th sheet of 470208 drawing number sheet, applicable for right hand parts  
 d. none of the above
84. According to standard Blue Print paper sizes. If a paper have a size 4, what does it symbolise  
 a. 17" X 11"  
 b. 11" X 17"  
 c. 22" X 17" \*  
 d. 17" X 22"
85. A Standard drawing size can be specified by  
 a. letter  
 b. number  
 c. either a or b \*  
 d. both a & b
86. A Standard drawing size and drawing number are separated by  
 a. Dash \*  
 b. space  
 c. star  
 d. none of the above
87. On assembly drawing, each item is identified by  
 a. a number in circle  
 b. a number in square  
 c. both a & b  
 d. either a or b \*
88. Revision to a drawing are necessitated by changes in  
 a. dimensions  
 b. design  
 c. materials  
 d. any of the above \*
89. A revision block contains  
 a. identification symbol, Date  
 b. nature of revision, Authority for the change  
 c. name of draftman  
 d. all of the above \*
90. When notes are placed elsewhere on the drawing, then they are identified by  
 a. letters  
 b. number  
 c. both a & b  
 d. either a or b \*
91. What are the most common methods of illustrating objects  
 a. pictorial drawing  
 b, orthographic projection  
 c. diagrams  
 d. all of the above \*

92. In which drawing material of the part to be manufactured is specified
- detail drawing \*
  - assembly drawing
  - installation drawing
  - none of the above
93. On which places a Drawing Number can be specified on Title Block
- lower right hand corner
  - near top border line
  - upper right hand corner
  - on reverse side of print at both ends
  - any of the above \*
94. If print has more than one sheet, then
- each sheet shall have same number, but different part number
  - each sheet shall have same number, but different sheet number
  - as in b and this information is indicated on Number Block
  - as in c and number of sheets in the series \*
95. Dash number are used to identify
- right hand corner & left hand corner
  - right hand and left hand parts \*
  - lower right hand & left hand components
  - upper right hand & lower left hand parts
96. In Title Block, Name of organisation is stated where
- upper right hand corner
  - lower right hand corner
  - upper top \*
  - lower bottom
97. In Title Block, Name of checker is specified where
- upper right hand corner
  - lower right hand corner
  - upper left hand corner
  - lower left hand corner \*
98. In Title Block, Drawing Number is specified where
- upper right hand corner
  - lower right hand corner \*
  - upper left hand corner
  - lower left hand corner
99. What are the information specified in lower right hand corner of title block
- Drawing by, checker by
  - Submitted by, Drawing No. \*
  - Name of organisation, Name of assembly
  - Name of Draftmen, Date
100. Drawing Number and other data concerning the drawing are specified in which corner of Title Block
- upper right hand corner
  - lower right hand corner \*
  - upper left hand corner
  - lower left hand corner
101. What are the possible views is an orthographic projection
- front rear
  - top, bottom
  - right side, left side
  - all of the above \*
102. One view drawings are commonly used for
- objects of uniform thickness
  - cylindrical, spherical or square parts
  - gaskets, shims and plates
  - all of the above \*.



# CHAPTER - 4

## DETAILED KNOWLEDGE OF VARIOUS TYPES OF GEARS AND BEARINGS, THEIR USE AND COMMON DEFECTS

1. Which of the following type of bearing will you select for combined radial and axial loads
  - a. single row angular contact ball bearing
  - b. spherical roller bearing
  - c. cylindrical roller bearing
  - d. spherical roller thrust bearing
  - e. taper roller bearing \*

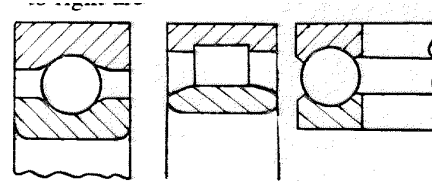


Fig.4.2.

2. Which of the following type of bearing will you select for high load carrying, self aligning type for heavy radial loads with considerable axial load in both directions
  - a. spherical roller bearing \*
  - b. spherical roller thrust bearing
  - c. taper roller bearing
  - d. double row angular contact ball bearing
  - e. self aligning ball bearing

6. The circlip shown in Fig. 4.3 is
  - a. external circlip
  - b. radial circlip
  - c. axial circlip
  - d. internal circlip \*
  - e. universal circlip

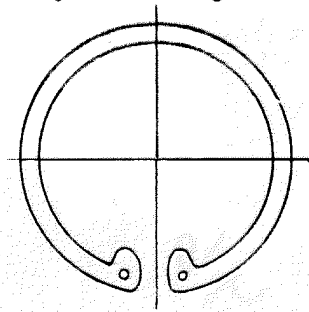


Fig.4.3.

3. Double row angular contact ball bearing is used for applications involving
  - a. heavy axial loads
  - b. radial loads with heavy thrust in both directions \*
  - c. combined radial and axial loads
  - d. axial load in one direction only
  - e. axial load in both directions

4. The circlip shown in Fig. 4.1 is
  - a. internal circlip
  - b. external circlip \*
  - c. radial circlip
  - d. axial circlip
  - e. universal circlip

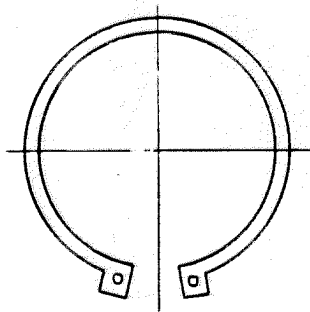


Fig.4.1.

7. Fig. 4.4 shows O-Rings and its application in sealing moving parts. The O-ring is designated by the dimensions
  - a.  $d \times S$
  - b.  $d_1 \times s$
  - c.  $d_2 \times S$
  - d.  $D \times D_1$  \*
  - e.  $D \times b$

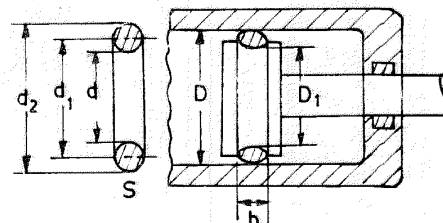


Fig.4.4

5. The three bearings shown in Fig.4.2 from left to right are
  - a. deep groove, roller, thrust \*
  - b. roller, deep groove, thrust
  - c. self aligning, roller, thrust
  - d. roller, self aligning, thrust
  - e. angular contact, thrust, deep groove

8. Which of the following journal bearing material is self lubricating type
  - a. wood
  - b. cast iron
  - c. babbitt
  - d. carbon graphite
  - e. sintered \*

9. Which of the following journal bearing material needs no lubrication
  - a. carbon graphite \*
  - b. rubber
  - c. sintered
  - d. moulded plastic
  - e. bronze
10. Which of the following bearing material needs water lubrication
  - a. rubber \*
  - b. wood
  - c. cast iron
  - d. moulded plastic
  - e. babbit
11. In hydrodynamic journal bearing, if the clearance ratio is halved, then Sommerfeld number (S) and coefficient of friction ( $\mu$ ) will change as follows
  - a. S becomes double and  $\mu$  is halved
  - b. S becomes four times and  $\mu$  is doubled \*
  - c. S becomes half and  $\mu$  is doubled
  - d. S becomes four times and  $\mu$  is halved
  - e. S becomes one fourth and  $\mu$  is halved
12. The ball bearings are, usually, made from
  - a. low carbon steel
  - b. high carbon steel
  - c. medium carbon steel \*
  - d. high speed steel
13. The metal suitable for bearings subjected to heavy load is
  - a. silicon bronze
  - b. white metal \*
  - c. monel metal
  - d. phosphor bronze
14. The metal suitable for bearings subjected to light load is
  - a. silicon bronze
  - b. white metal
  - c. monel metal
  - d. phosphor bronze \*
15. Gears are casted by
  - a. sand mould casting
  - b. slush casting
  - c. permanent mould casting \*
  - d. centrifugal casting
16. In thrust bearing, the load acts
  - a. along the axis of rotation \*
  - b. parallel to the axis of rotation
  - c. perpendicular to the axis of rotation
  - d. in any direction
17. A sliding bearing which operates without any lubricant present
  - a. zero film bearing \*
  - b. boundary lubricated bearing
  - c. hydrodynamic lubricated bearing
  - d. hydrostatic lubricated bearing
18. In a hydrodynamic lubricated bearing
  - a. there is thick film of lubricant between the journal and the bearing \*
  - b. there is a thin film of lubricant between the journal and the bearing
  - c. there is no lubricant between the journal and the bearing
  - d. the lubricant is forced between the journal and the bearing, by external pressure
19. In a boundary lubricated bearing, there is a ..... of lubricant between the journal and the bearing.
  - a. thick film
  - b. thin film \*
20. When the lubricant is forced between the journal and the bearing by external pressure, the bearing is called hydrostatic lubricated bearings.
  - a. Agree \*
  - b. Disagree
21. When the shaft rotates in anticlockwise direction at slow speed in a bearing, it will
  - a. have contact at the bottom most of the bearing
  - b. move towards right of the bearing making the metal to metal contact
  - c. move towards right of bearing making no metal to metal contact
  - d. move towards left of the bearing making metal to metal contact \*
22. When the shaft rotates in anticlockwise direction at high speed in a bearing, it will
  - a. have contact at the bottom most of bearing
  - b. move towards right of the bearing making the metal to metal contact
  - c. move towards right of bearing making no metal to metal contact \*
  - d. move towards left of the bearing making metal to metal contact
23. The property of a bearing material which has the ability to accommodate shaft deflections and bearing inaccuracies by plastic deformation without excessive wear and heating, is known as
  - a. bondability
  - b. embeddability
  - c. conformability \*
  - d. fatigue strength
24. The property of a bearing material which has the ability to accommodate small particles of dust, grit etc. without scoring the material of the journal, is called
  - a. bondability
  - b. embeddability \*
  - c. conformability
  - d. fatigue strength
25. Teflon is used for bearings because of
  - a. low coefficient of friction \*
  - b. better heat dissipation
  - c. smaller space consideration
  - d. all of these

26. The bearing characteristic number in a hydrodynamic bearing depends upon  
 a. length, width and load  
 b. length, width and speed  
 c. viscosity, speed and load  
 d. viscosity, speed and bearing pressure \*
27. When the bearing is subjected to large fluctuations of load and heavy impacts, the bearing characteristic number should be ..... the bearing modulus.  
 a. 5 times                                      b. 10 times  
 c. 15 times \*                                      d. 20 times
28. When the length of the journal is equal to diameter of the journal, then the bearing is said to be a  
 a. short bearing                                      b. long bearing  
 c. medium bearing                                      d. square bearing \*
29. For crank shaft bearings, the ratio of the length of the journal to its diameter is less than unity.  
 a. Correct \*                                      b. Incorrect
30. In a journal bearing, the load on the bearing is ..... to the axis of the journal.  
 a. parallel                                      b. perpendicular \*
31. In an oil lubricated journal bearing, the coefficient of friction between the journal and the bearing  
 a. remains constant at all speeds  
 b. is minimum at zero speed and increases monotonically with increase in speed  
 c. is maximum at zero speed and decreases monotonically with increase in speed  
 d. becomes minimum at an optimum speed and then increases with further increase in speed \*
32. Antifriction bearings are  
 a. thick lubricated bearings  
 b. plastic bearings  
 c. thin lubricated bearings.  
 d. ball and roller bearings \*
33. The rolling contact bearings as compared to sliding contact bearings have  
 a. small overall dimensions  
 b. accuracy of shaft alignment  
 c. low starting and low running friction except at very high speeds  
 d. all of the above \*
34. The ball bearings are provided with a cage  
 a. to reduce friction  
 b. to facilitate slipping of balls  
 c. to prevent the lubricant from flowing out  
 d. to maintain the balls at a fixed distance apart \*
35. Deep groove ball bearings are used for  
 a. heavy thrust load only  
 b. small angular displacement of shafts  
 c. radial load at high speed  
 d. combined thrust and radial loads at high speed \*
36. The antifriction bearings  
 a. have low starting and low running friction at moderate speeds  
 b. have high initial cost  
 c. can carry both radial and thrust loads  
 d. all of these \*
37. Tapered roller bearings can take  
 a. radial load only  
 b. axial load only  
 c. both radial and axial loads and the ratio of these being less than unity  
 d. both radial and axial load and the ratio of these being greater than unity \*
38. The rolling contact bearings are known as  
 a. thick lubricated bearings  
 b. plastic bearings  
 c. thin lubricated bearings  
 d. antifriction bearings \*
39. If a bearing is designated by the number 305, it means that the bearing is of  
 a. light series whose bore is 5 mm  
 b. light series whose bore is 25 mm  
 c. medium series whose bore is 5 mm  
 d. medium series whose bore is 25 mm \*
40. Which of the following is an antifriction bearing ?  
 a. journal bearing                                      b. pedestal bearing  
 c. collar bearing                                      d. needle bearing \*
41. When two parallel and coplaner shafts are connected by gears having teeth parallel to the axis of the shaft, the arrangement is known as spiral gearing.  
 a. Yes                                      b. No \*
42. In skew bevel gearing, the axes of shafts are  
 a. intersecting and the teeth are curved  
 b. non-intersecting and non-parallel and the teeth are curved  
 c. non-intersecting and non-parallel and the teeth are straight \*  
 d. none of the above
43. Deep groove ball bearings are used for  
 a. heavy thrust load only  
 b. small angular displacement of shafts  
 c. radial load at high speed  
 d. combined thrust and radial loads at high speed \*
45. An imaginary circle which by pure rolling action gives the same motion as the actual gear, is called  
 a. addendum circle                                      b. dedendum circle  
 c. pitch circle \*                                      d. clearance circle
46. The size of a gear is usually specified by  
 a. pressure angle  
 b. pitch circle diameter \*  
 c. circular pitch

- d. diametral pitch
47. The radial distance of a tooth from the pitch circle to the top of the tooth is called
- dedendum
  - addendum \*
  - clearance
  - working depth
48. The dedendum is the radial distance from the
- pitch circle to the top of a tooth
  - pitch circle to the bottom of a tooth \*
  - top of a tooth to the bottom of a tooth
  - addendum circle to the clearance circle.
49. The radial distance from the top of a tooth to the bottom of a tooth is called clearance.
- True \*
  - False
50. The radial distance from the ..... to the clearance circle is called working depth.
- addendum circle \*
  - dedendum circle
51. The face of the tooth is the
- surface of the top of the tooth
  - surface of the tooth above the pitch surface \*
  - surface of the tooth below the pitch surface
  - width of the tooth measured along the pitch circle
52. The flank of the tooth is the
- surface of the top of the tooth
  - surface of the tooth above the pitch surface
  - surface of the tooth below the pitch surface \*
  - width of the tooth measured along the pitch circle
53. The ratio of number of teeth to the pitch circle diameter in millimeters is called circular pitch.
- Agree
  - Disagree \*
54. The ratio of pitch circle diameter in millimeters to the number of teeth, is called
- circular pitch
  - diametral pitch
  - module \*
  - none of these
55. The backlash for spur gears depend upon
- module
  - pitch line velocity
  - tooth profile
  - both a. and b.\*
56. The difference between the tooth space and the tooth thickness as measured on the pitch circle, is called
- working depth
  - clearance
  - face width
  - backlash \*
57. The contact ratio is the ratio of
- length of path of contact to the circular pitch
  - length of arc of contact to the circular pitch \*
  - length of arc of approach to the circular pitch
  - length of arc of recess to the circular pitch
58. According to law of gearing, the common normal at the point of contact between a pair of teeth must always pass through the pitch point.
- Right \*
  - Wrong
59. The velocity of sliding ..... the distance of the point of contact from the pitch point.
- is directly proportional to \*
  - is inversely proportional to
  - is equal to  $\cos \phi$  multiplied by
  - does not depend upon
60. The pressure angle for involute gears depends upon the size of teeth
- Agree
  - Disagree \*
61. An involute pinion and gear are in mesh. If both have the same size of addendum, then there will be interference between the
- tip of the gear and flank of pinion \*
  - tip of the pinion and flank of gear
  - flanks of both gear and pinion
  - tip of both gear and pinion
62. Which of the following statement is correct for gears ?
- The addendum is less than dedendum
  - The pitch circle diameter is equal to the product of module and number of teeth.
  - The pitch circle is always greater than the base circle.
  - all of the above \*
63. In a gear, having involute teeth, the normal to the involute is a tangent to the
- pitch circle
  - base circle \*
  - addendum circle
  - dedendum circle
64. If the centre distance of the mating gears having involute teeth is varied within limits, the velocity ratio
- increases
  - decreases
  - remains unchanged \*
65. When the top of a tooth undercuts the root on the mating gear, it is known as interference.
- Yes \*
  - No
66. The interference may only be avoided if the addendum circles of the two mating gears cut the common tangent to the base circle between the points of tangency.
- True \*
  - False
67. The contact ratio for gears is
- zero
  - less than one
  - greater than one \*
  - none of these
68. If the centre distance of the mating gears having involute teeth is increased, then the pressure angle
- increases \*
  - decreases
  - remain unchanged
69. The dynamic tooth load is due to
- inaccuracies of tooth spacing
  - irregularities in tooth profiles
  - deflections of teeth under load





88. Helix angle of a spur gear is
- Zero \*
  - $90^\circ$
  - $60^\circ$
  - $45^\circ$
  - $22\frac{1}{2}^\circ$
89. A stub tooth is one that is
- Thicker in proportion to its length than involute tooth
  - Same as involute tooth
  - Smaller in proportion to its length than the involute tooth \*
  - None of these.
90. Two gears of same diameter D and number of teeth N are mounted on separate shafts. One gear meshes with another spur gear of diameter 3 D having 3 N teeth. Other gear on the shaft meshes with an internal gear having diameter 3 D and number of teeth N. The direction of rotation of meshing gear will be.
- Same
  - Opposite.\*
91. Which of the following gears are not used to transmit motion from one shaft to another shaft at an angle to the first ?
- Bevel gears
  - Helical gears
  - Spur gears \*
  - Herringbone gears
  - Worm gears.
92. Which machine can be used for grinding the ball bearing outer races
- Cylindrical grinding machine
  - Centreless grinding machine \*
  - Magnetic chuck grinding machine
  - Surface grinding machine
  - Universal grinding machine.
93. A rack is gear of
- Infinite pitch
  - Infinite module
  - Infinite diameter
  - Infinite number of teeth \*
  - $90^\circ$  pressure angle .
94. A triple threaded worm is in mesh with a worm wheel of 40 teeth. If the worm revolves at 1200 rpm, the rpm of the worm wheel will be
- 10 \*
  - 30
  - 40
  - 90
  - 270.
95. Hobbing process cannot be used to cut
- Spur gears
  - Helical gears
  - Worm gears
  - Bevel gears \*
  - All of the above.
96. Which of the following is gear finishing process ?
- Gear lapping
  - Gear shaving
  - Gear grinding
  - All of the above \*
  - None of the above.
97. The process of cutting thin gears from metal sheets is known as
- Extruding
  - Stamping \*
  - Sintering
  - Rolling
  - Punching.
98. Which type of gears can be manufactured by extrusion process ?
- Bevel gears
  - Herringbone gears
  - Helical gears
  - Worm gears
  - Spur gears.\*
99. Gear made by sand casting are used in
- Automobiles
  - Machine tools
  - Diesel locomotives
  - Concrete mixers \*
  - Toys.
100. Type of gears used in electric switch gear is
- Spiral gears
  - Bevel gears
  - Helical gears
  - Herringbone gears
  - Gears are not used in switch gear.\*
101. Which of the following method cannot be used for manufacturing internal gears ?
- Stamping
  - Casting
  - Die casting
  - Broaching
  - Hobbing.\*
102. Plastic gears are used in
- Toys
  - Instruments
  - Low load applications
  - Low noise applications
  - Any of the above.\*
103. Internal gears and splines used in automobile industry are manufactured by
- Casting
  - Milling
  - Broaching \*
  - Gears shaping
  - Gears hobbing.
104. Automobile gears are generally manufactured by
- Hobbing \*
  - Stamping
  - Extrusion
  - Die casting
  - Rolling.
105. Die casted gears are generally used in
- Counters
  - Toys
  - Cameras

- d. Any of the above \*
- e. None of the above.

106. Cast iron gears are used where
- a. Stresses on gear are not high
  - b. Size of the gear is large
  - c. High order of accuracy is not desired
  - d. All of the above \*
  - e. None of the above.

107. Nitrided steel is used for gears where
- a. High hardness is desired on teeth \*
  - b. Low speed operation is desired
  - c. Variable speed operation is desired
  - d. Variable load operation is desired
  - e. Varying stresses are expected on teeth.

108. Aluminium gears are generally used in
- a. Compressors
  - b. Speed reducers
  - c. Instruments \*
  - d. Worm wheels
  - e. None of the above.

109. The material for worm wheels is usually
- |                |             |
|----------------|-------------|
| a. Aluminium   | b. Copper   |
| c. Cast iron   | d. Bronze * |
| e. Cast steel. |             |

110. A rack is a gear of
- a. Infinite pitch
  - b. Infinite module
  - c. Infinite diameter \*
  - d. Infinite number of teeth
  - e. Infinite clearance.

111. Which quality of fit is provided for plummer block bearings ?
- |                       |         |
|-----------------------|---------|
| a. H8f <sub>8</sub>   | b. H6f6 |
| c. H8d8 *             | d. H6g5 |
| e. None of the above. |         |

112. Inverted tooth chain drive is also known as
- a. gear drive
  - b. dynamic chain drive
  - c. silent chain drive \*
  - d. positive chain drive
  - e. frictionless chain drive

113. The bearing shown in Fig. 4.5 is a single row
- a. deep groove type
  - b. self aligning type
  - c. angular contact type \*
  - d. single thrust type
  - e. cylindrical roller type

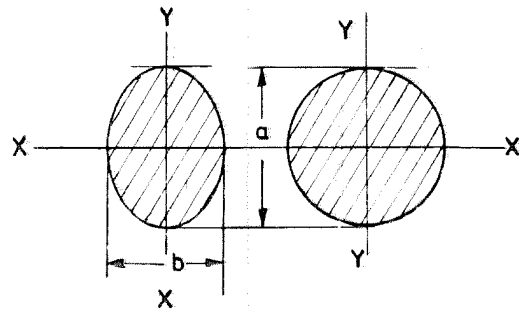


Fig.4.5.

114. A clutch is placed in the power train between the
- a. crankshaft and the transmission (change gears) \*
  - b. change gears and front axles
  - c. front axles and differential
  - d. high and low gears
  - e. before and after the gear box
115. The gear in the transmission that is always in mesh with the clutch gear is called the
- a. idler gear
  - b. countershaft drive gear \*
  - c. countershaft second gear
  - d. second-and-high speed gear
  - e. low speed gear
116. In the differential, the ring gear is attached to the
- |                             |                    |
|-----------------------------|--------------------|
| a. bevel gear *             | b. drive gear      |
| c. differential case        | d. propeller shaft |
| e. differential pinion gear |                    |
117. Which of the following gear is equivalent to a right-hand and a left-hand helical gear placed side by side
- |                  |                 |
|------------------|-----------------|
| a. hypoid        | b. spiroid      |
| c. herringbone * | d. differential |
| e. worm          |                 |
118. The reduction in size of gear reducer unit is possible by
- a. use of full hardened and ground gears \*
  - b. use of forced lubrication
  - c. using gears of smaller size
  - d. use of ball and roller bearing in place of sleeve bearings
  - e. use of light weight gears of aluminium or reinforced plastic material
119. Pick up false statement about helical gears
- a. helical gears are used when both high speed and high horsepower are required
  - b. large helix angles (30-45°) impose high thrust loads on bearings when single helicals are used
  - c. large helix angles increase gear back lash unless precisely cut and installed
  - d. large helix angles decrease weight
  - e. smaller helix angles (below 30°) may increase gear\* wear slightly but improve backlash tolerance and give lower bearing loads

120. Following are the main types of gears to join parallel shafts
- spur gears
  - helical gears
  - double helical gear
  - all of the above \*
121. The gear used to connect two parallel shafts and having straight teeth parallel to the axis of the wheel is known as
- spur gears \*
  - helical gears
  - double helical gear
  - all of the above
122. The gear used to connect two parallel shafts and having teeth inclined (or curved) to the axes of the shafts is known as
- spur gears
  - helical gears \*
  - double helical gear
  - both b & c
123. The contact occurs at a point of curved teeth at the beginning of engagement and afterwards extends along a diagonal line across the teeth
- helical gear \*
  - spur gear
  - both a & b
  - none of these
124. A pair of helical gears secured together, one having a right hand helix and the other a left hand helix is known as
- spur gears
  - helical gears
  - double helical gear \*
  - none of these
125. The gears used to connect two intersecting shafts are known as
- spur gear
  - Bevel gear \*
  - helical gear
  - double helical gear
126. If the teeth on the gears are straight radial to the point of intersection of shaft axes then gears are known as
- straight bevel \*
  - bevel gear
  - helical gear
  - spur gear
127. The gears used to connect two non-parallel and non-intersecting shafts are known as
- skew bevel gears \*
  - helical gear
  - both a & c
  - none of these
128. The peripheral velocity of the gears are
- low velocity gears
  - medium velocity gears
  - high velocity gear
  - all of the above \*
129. If the velocity of the gears is less than 2 m/s are known as
- low velocity gear \*
  - medium velocity gear
  - high velocity gear
  - none of the above
130. If the velocity of the gears are between 3 m/s and 15 m/s are known as
- low velocity gear
  - medium velocity gear \*
  - high velocity gear
  - none of these
131. If the velocity of gears are more than 15 m/s the gears are known as
- low velocity gear
  - medium velocity gear
  - high velocity gear \*
  - none of these
132. In a full journal bearing the angle of contact of the bearing with the journal is
- |                |                  |
|----------------|------------------|
| a. $120^\circ$ | b. $130^\circ$   |
| c. $270^\circ$ | d. $360^\circ$ * |
133. A sliding bearing which can support steady loads without any relative motion between the journal and the bearing is called
- zero film bearing \*
  - boundary lubricated bearing
  - hydrodynamic lubricated bearing
  - hydrostatic lubricated bearing
134. In a boundary lubricated bearing, there is a ..... of lubricant between the journal and the bearing
- thick film
  - thin film \*
  - zero film
  - both 'b' & 'c'
135. The property of a bearing material which has the ability to accommodate small particles of dust, grit etc. without scoring the material of the journal is called
- boundability
  - embeddability \*
  - conformability
  - fatigue strength
136. When the bearing is subjected, to large fluctuations of load and heavy impacts, the bearing characteristic number should be ..... the bearing modulus
- |               |             |
|---------------|-------------|
| a. 5 times    | b. 10 times |
| c. 15 times * | d. 20 times |

137. When the length of the journal is equal to the diameter of the journal, then the bearing is said to be a
- short bearing
  - long bearing
  - medium bearing
  - square bearing \*
138. In thrust bearings, the load acts
- along the axis of rotation \*
  - parallel to the axis of rotation
  - perpendicular to the axis of rotation
  - in any direction
139. The rolling contact bearing are known as
- plastic bearing
  - sleeve bearing
  - antifriction bearing
  - all of the above \*
140. The bearing of medium series have capacity ..... over the light series
- 10 to 20%
  - 20 to 30%
  - 30 to 40% \*
  - 40 to 50%
141. The bearing of heavy series have capacity ..... over the medium series
- 10 to 20%
  - 20 to 30% \*
  - 30 to 40%
  - 40 to 50%
142. The gears are termed as medium velocity gears if their peripheral velocity is
- 1 - 3 m/s
  - 3 - 15 m/s \*
  - 15 - 30 m/s
  - 30 - 50m/s
143. The size of a gear is usually specified by
- pressure angle
  - pitch circle diameter \*
  - circular pitch
  - diametral pitch
144. The radial distance from the ..... to the clearance circle is called working depth
- addendum circle \*
  - dedendum circle
  - flank
  - both 'a' & 'b'
145. The product of the diametral pitch and circular pitch is equal to
- 1
  - $1/\pi$
  - $\pi$  \*
  - $\pi \times$  No. of teeth
146. The back lash for spur gears depends upon
- Module
  - pitch line velocity
  - tooth profile
  - both 'a' & 'b' \*
147. The contact ratio for gear is
- zero
  - less then one
  - greater then one \*
  - none of these
148. If the centre distance of the mating gears having involute teeth is increased then the pressure angle
- increases \*
  - decreases
  - remain unchanged
  - none of the above
149. Lewis equation is applied
- only to the pinion
  - only to the gear
  - to stronger of the pinion or gear
  - to weaker of the pinion or gear \*



## CHAPTER - 5

# KNOWLEDGE OF VARIOUS FORMS OF THREADS USED IN BRITISH AND AMERICAL SYSTEM AND VARIOUS TYPES OF DRILLS, TAPS, REAMERS

1. Fig. 5.1 shows the basic profile of ISO metric screw thread. The dimensions A and B in terms of H are

- a.  $\frac{H}{8}$  and  $\frac{H}{8}$
- b.  $\frac{H}{4}$  and  $\frac{H}{4}$
- c.  $\frac{H}{4}$  and  $\frac{H}{8}$
- d.  $\frac{H}{8}$  and  $\frac{H}{4}$  \*
- e.  $\frac{H}{5}$  and  $\frac{H}{5}$

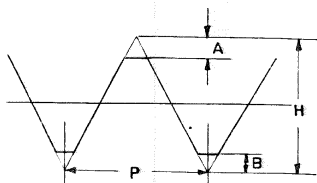


Fig.5.1.

2. The relationship between P and H in Fig. 5.1 is
- a.  $H = P$
  - b.  $H = \frac{3}{4} P$
  - c.  $h = \frac{7}{8}$
  - d.  $H = 0.8 P$
  - e.  $H = 0.86603 P$  \*
3. The included angles for ISO metric threads and standard pipe threads are
- a.  $55^\circ, 60^\circ$
  - b.  $57\frac{1}{2}^\circ, 60^\circ$
  - c.  $60^\circ, 55^\circ$  \*
  - d.  $62\frac{1}{2}^\circ, 57\frac{1}{2}^\circ$
  - e.  $65^\circ, 55^\circ$
4. As ISO metric threaded component is designated as  $M 16 \times 1.5$ . Here 16 is
- a. pitch
  - b. major diameter \*
  - c. pitch diameter
  - d. minor diameter
  - e. depth of thread

5. Fig. 5.2 shows the design profile of nut and bolt of ISO Metric thread. Dimension A =

- a.  $H/4$
- b.  $H/5$
- c.  $H/6$  \*
- d.  $H/7$
- e.  $H/8$

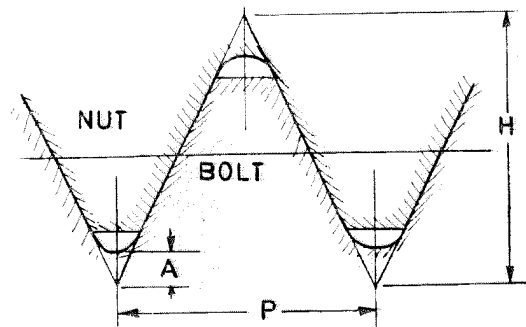


Fig.5.2.

6. A twist drill has following number of cutting edges
- a. 1
  - b. 2 \*
  - c. 3
  - d. 4
  - e. none of the above
7. A reamer is similar to a drill but it has several cutting edges and
- a. straight flutes \*
  - b. inclined flutes
  - c. helical flutes
  - d. tapered flutes
  - e. chamfered flutes
8. Twist drills are usually considered suitable for machining holes having a length less than
- a. Two times their diameter
  - b. Five times their diameter \*
  - c. Ten times their diameter
  - d. All of the above
  - e. None of the above
9. The largest diameter of an external or internal screw thread is known as
- a. minor diameter
  - b. major diameter \*
  - c. pitch diameter
  - d. none of these
10. The pitch diameter is the ..... diameter of an external or internal screw thread.
- a. effective \*
  - b. smallest
  - c. largest
11. The major diameter of a screw thread is also known as core or root diameter.
- a. Yes
  - b. No \*

12. The minor diameter of a screw thread is also known as outside or nominal diameter.  
 a. Right b. Wrong \*
13. The smallest diameter of an external or internal screw thread is known as  
 a. minor diameter \* b. major diameter  
 c. pitch diameter d. none of these
14. In a nut and bolt, the diameter at which the ridges on the bolt are in complete touch with the ridges of the corresponding nut, is called pitch diameter.  
 a. Correct \* b. Incorrect
15. A screw is specified by its  
 a. major diameter \* b. minor diameter  
 c. pitch diameter d. pitch
16. Which of the following statement is correct ?  
 a. The distance from a point on one thread to the corresponding point on the next thread is called pitch.  
 b. The distance which a screw thread advances axially in one rotation of the nut is called lead.  
 c. In single start threads, lead is equal to pitch.  
 d. all of the above \*
17. A bolt has  
 a. threads for the nut at one end and head at the other end \*  
 b. head at one end and the other end fits into a tapped hole one of the parts to be fastened  
 c. threads at both ends  
 d. pointed threads
18. A tap bolt has  
 a. threads for the nut at one end and head at the other end  
 b. head at one end and the other end fits into a tapped hole one of the parts to be fastened \*  
 c. threads at both ends  
 d. pointed threads
19. The important purpose of flutes in a drill is that they enable the  
 a. cutting fluid to enter the working zone  
 b. chips to come out  
 c. strength of the drill at the cutting point  
 d. weight of the drill to be reduced  
 e. cutting edges to be formed \*
20. The usual value of helix angle of a drill is  
 a.  $10^\circ$  b.  $20^\circ$   
 c.  $30^\circ$  \* d.  $60^\circ$   
 e.  $118^\circ$
21. The point angles and clearance angles of drills depend on  
 a. drill diameter  
 b. material to be drilled \*  
 c. r.p.m. of the drill  
 d. depth of the hole to be drilled  
 e. type of lubricant used
22. The rake angle of a single point cutting tool corresponds to following angle of a twist drill  
 a. point angle b. helix angle \*  
 c. lip diameter angle d. chisel edge angle  
 e. primary angle
23. A twist drill is specified by  
 a. its diameter and lip angle  
 b. its material and shank  
 c. its shank and diameter  
 d. shank, material and flute size  
 e. shank, material and diameter \*
24. All straight shanked drills used in drill press work must be held in the  
 a. spindle of the drill press b. key type drill chuck \*  
 c. tapers sleeve d. vise  
 e. universal head
25. Point angle of  $118^\circ$  on drills is used for  
 a. all general applications on mild steel \*  
 b. bakelite, hard rubber and fibrous plastics  
 c. hard steel and nickle alloys  
 d. thin steel metal  
 e. there is no such criterion
26. Cutting fluid in drilling operation is used to  
 a. cool the drill  
 b. cool the work  
 c. aid in rapid removal of chips  
 d. improve the finish of the drilled hole  
 e. all of the above \*
27. The work is usually rotated while the drill is fed into the work in  
 a. hand drilling machine  
 b. radial drilling machine  
 c. deep hole drilling machine \*  
 d. multiple spindle drilling machine  
 e. none of the above
28. Point angle of  $135^\circ$  on drills is used for  
 a. all applications on M.S.  
 b. bakelite, hard rubbers and fibrous plastics  
 c. hard steels and nickel alloys  
 d. thin sheet metal  
 e. both 'c' and 'd' are correct \*
29. For drilling aluminium, a drill with  
 a. high helix angle is required \*  
 b. low helix angle is required  
 c. any helix angle can be used  
 d. zero helix angle is required  
 e. none of the above
30. For drilling glass, slate, ceramic and masonry, following drill is used  
 a. twist drill b. spade bit  
 c. tungsten carbide-tipped bit \*  
 d. auger  
 e. hardened steel drill

31. When the lip clearance of a drill is too small, i.e. when it requires resharpening
- it will drill a bigger hole
  - it will drill an eccentric hole
  - it will drill an elliptical hole
  - it will drill a rough hole
  - drill will not be able to enter the work \*
32. The twist drill works by
- being forced through the material
  - rotating against the material with sufficient pressure to cause it to penetrate the material \*
  - rotating against the material and being pulled through by spiral of the flutes
  - all of the above
  - none of the above
33. The rake angle of single point cutting tool is equivalent to
- helix angle of a twist drill \*
  - the lip angle of twist drill
  - end cutting edge angle of a twist drill
  - the relief angle of a twist drill
  - none of the above
34. For drilling brass, a drill with
- high helix angle is required
  - low helix angle is required \*
  - any helix angle can be used
  - zero helix angle is required
  - none of the above
35. To provide a positive drive, all taper shanked drills are provided with
- sleeve
  - socket
  - tang \*
  - neck
  - head
36. If a drill does not cut, the probable cause could be that
- material is hard
  - speed is low
  - no lubricant is used
  - drill is blunt \*
  - drill is not mounted properly
37. Which portion of a taper shank drill prevents drill from slipping and thus ensures a positive drive
- sleeve
  - socket
  - neck
  - tang \*
  - flutes
38. If a drill breaks when drilling a soft and tough material, it could be due to
- low speed
  - blunt drill
  - hard drill
  - obstruction of flute of drill by chips \*
  - no lubricant
39. To reduce the feeding pressure needed for drilling larger holes, it is a good practice first to
- anneal the workpiece
  - drill a countersunk hole
  - drill a small pilot hole \*
  - drill a stepped hole
  - mark a centre hole
40. A drill having flat side and two cutting edges for drilling large holes is called
- micro-drill
  - spade-drill \*
  - boring tool
  - counter-boring tool
  - deep hole drill
41. Kerosene is a good cutting fluid to use when drilling
- cast iron
  - mild steel
  - aluminium \*
  - brass
  - bronze
42. The taper usually employed in drill sleeves is known as
- Griling taper
  - Morse taper \*
  - Brown and Sharpe taper
  - 1 : 1 taper
  - metric taper
43. A taper shank drill is removed from the drill spindle by
- tapping the drill by a hammer
  - a screw driver
  - a draft
  - a drift \*
  - a tang
44. Oversized holes in drilling are caused by
- equal lengths of lips
  - unequal length of lips \*
  - larger helix angle
  - smaller helix angle
  - worn-out drills
45. When the cutting lips of a drill are uneven in length, the drill will cut a
- larger hole than the drill size \*
  - small hole than the drill size
  - same size hole as the drill size
  - unpredictable
  - none of the above
46. The flutes of a drill perform the following function
- help from the cutting edge of the drill point
  - curb the chip tightly for easier removal
  - form channels through which the chips can escape from the hole being drilled
  - allow the coolant and lubricant to get down to the cutting edge
  - all of the above \*



47. For reaming operation in blind hole, following type of reamer should be used
- straight flute reamer
  - right hand spiral fluted reamer \*
  - left hand spiral fluted reamer
  - any one of the above
  - none of the above
48. Drills are usually made of
- plain high-carbon tool steel
  - alloy steel
  - high-speed steel \*
  - tungsten carbide
  - cast alloys
49. A boring tool for boring a hole over a large length should have
- one tool bit on a bar
  - 2 tool bits fitted on diametrically opposite sides of bar \*
  - 3 tool bits equally spaced
  - 4 or more tool bits
  - none of the above
50. The machining process which makes a cone-shaped recess at the top of a drilled hole for a head machine screw is called
- counter-boring
  - die-sinking
  - counter-sinking \*
  - taper drilling
  - spot-facing
51. The groove in the body of the drill which allows the chips to come out is known as
- chip breaker
  - lip
  - flute \*
  - margin
  - chip-follower
52. Which is correct statement  
A twist drill
- should not be relied on for accurately sized holes\*
  - can be relied on for accurately sized holes
  - capability for production of accurately sized holes depends on its condition
  - is most commonly used for production accurately sized holes
  - none of the above
53. The reamer is always removed from the finished holes
- by reversing the drill press
  - by stopping the machine before removing the reamer
  - by slowing the machine before removing the reamer
  - before stopping the machine \*
  - none of the above
54. For reaming copper or soft aluminium. following type of reamer should be used
- straight flute reamer
  - right hand spiral fluted reamer
  - left hand spiral fluted reamer \*
  - any one of the above
  - none of the above
55. The operation of providing a smooth seat or bearing surface around a previously drilled hole for a washer or nut is called
- boring
  - counter-boring
  - counter-sinking
  - spot-facing \*
  - chamfering
56. The operation of making a recess at the top of a drilled hole for a flat-head machine screw is called
- boring
  - counter-sinking \*
  - micro-boring
  - reaming
  - spot-facing
57. A cutting tool used to make a recess at the top of a drilled hole for a flat head machine screw is known as
- a core drill
  - a spade drill
  - a reamer
  - an end mill
  - a countersink tool \*
58. The purpose of reaming is
- for making a hole initially
  - to enlarge the diameter of the hole
  - to improve the finish of the hole \*
  - to achieve correct diameter
  - to correct location of hole
59. For reaming holes with solid reamers, reamer is mounted in
- a rigid holder
  - a floating holder \*
  - a semi-rigid holder
  - a collet
  - universal holder
60. Reamer is always held in
- floating chuck
  - mandrel \*
  - coller chuck
  - self and centering chuck
  - universal chuck
61. Solid reamers do almost all their cutting with
- flutes
  - bottom-most surface
  - 45° chamfered front end \*
  - all of the above
  - none of the above
62. The tool used to withdraw a drill from its sleeve is called
- allen key
  - drift \*
  - taper key
  - drill puller
  - none of the above
63. The depth of a drilled hole is measured from the work surface to
- the point made by the drill
  - the depth of the full diameter of the drill
  - a point midway between the point and full diameter
  - all of the above \*
  - none of the above

64. The function of flutes of the reamer is to  
 a. cut the metal  
 b. guide the reamer  
 c. slightly improve the finish  
 d. both 'b' and 'c' are correct \*  
 e. none of the above
65. When drilling cast iron, the following coolant should be used  
 a. kerosene  
 b. lard oil  
 c. compressed air \*  
 d. water with soluble oil  
 e. none of the above
66. For reaming purpose, the diameter of drill hole upto size of 25 mm should be made smaller than the desired final size by  
 a. 0.01 mm  
 b. 0.05 mm  
 c. 0.1 mm \*  
 d. 0.5 mm  
 e. 1.0 mm
67. The cutting speed to be used in reaming a hole in comparison to speed used in drilling that hole should be  
 a. same \*  
 b. more  
 c. less  
 d. could be any speed  
 e. as large as possible
68. The operation of threading a drilled hole is called  
 a. lapping  
 b. reaming  
 c. broaching  
 d. tapping \*  
 e. threading
69. A fluted tool used to cut internal threads is called  
 a. a tap \*  
 b. a chisel  
 c. a die  
 d. an end mill  
 e. spade drill
70. Hand-tapping is an operation for generation of internal threads. The number of taps generally used for hand tapping are  
 a. 1  
 b. 2  
 c. 3 \*  
 d. 4  
 e. depends on the diameter of the hole
71. For making a chamfer on the edge of a hole, the following operation is required  
 a. counter sinking \*  
 b. spot facing  
 c. counter boring  
 d. reaming  
 e. wide drilling
72. The chips formed in making threads by plug tap  
 a. get out through grooves  
 b. get out along with lubricant  
 c. get out through flutes \*  
 d. cannot get out  
 e. none of the above
73. A tap drill  
 a. is a special type of drill  
 b. does drilling and tapping operations simultaneously  
 c. is merely a convenient way to refer to the proper size drill to be used before using a tap \*  
 d. does not exist  
 e. none of the above
74. Bottoming tap is used  
 a. for most of the threading applications  
 b. for threading in bottom surface  
 c. only for threading in blind holes \*  
 d. does not exist  
 e. none of the above
75. A tool used in cutting and external thread is called a  
 a. twist drill  
 b. tap  
 c. die \*  
 d. end mill  
 e. half nut
76. Following type of reamer is used for soft aluminium or copper  
 a. straight fluted  
 b. left hand spiral fluted \*  
 c. right hand spiral fluted  
 d. bottoming reamer  
 e. taper reamer
77. Following type of reamer is used for blind hole  
 a. straight fluted \*  
 b. left hand spiral fluted  
 c. right hand spiral fluted  
 d. bottoming reamer  
 e. taper reamer
78. Screw threads may be cut on a 10 mm dia. steel rod by using  
 a. a circular split die \*  
 b. a set of taps  
 c. a drill and a reamer  
 d. as knurling tool  
 e. end mill
79. Fluteless taps  
 a. are not round  
 b. form threads with no chips  
 c. both 'a' and 'b' are correct \*  
 d. do not exist  
 e. none of the above

80. For setting the heads of socket-head cap screw flush or below the surface, following operation is required  
 a. counter boring                      b. counter sinking  
 c. spot facing \*                      d. reaming  
 e. wide drilling
81. For tapping purpose, drilling is done by a drill which cuts a hole  
 a. of outside diameter of thread  
 b. of inside diameter of thread  
 c. of effective diameter of thread  
 d. which of triangle to be taken out by tap \*  
 e. none of the above
82. In down milling cutter teeth and workpiece move in  
 a. same direction \*  
 b. opposite direction  
 c. perpendicular direction  
 d. tool moves down and work move up  
 e. work move down and tool moves up
83. Which of the following operation is first performed ?  
 a. Spot facing                      b. Boring \*  
 c. Tapping                      d. Drilling
84. A 15 mm drilling machine means that it can drill a hole  
 a. of maximum diameter 15 mm \*  
 b. in 15 mm thick plates  
 c. having cross-sectional area of 15 mm<sup>2</sup>  
 d. none of these
85. The cutting angle of a flat drill varies from  
 a. 3° to 8°                      b. 20° to 30°  
 c. 60° to 90°                      d. 90° to 120° \*
86. The relief or clearance at the cutting edge of a flat drill varies from  
 a. 3° to 8° \*                      b. 20° to 30°  
 c. 60° to 90°                      d. 90° to 120°
87. A drill considered as a cutting tool having zero rake, is known as a  
 a. flat drill  
 b. straight fluted drill \*  
 c. parallel shank twist drill  
 d. tapered shank twist drill
88. A drill mainly used in drilling brass, copper or softer material, is  
 a. flat drill  
 b. straight fluted drill \*  
 c. parallel shank twist drill  
 d. tapered shank twist drill
89. A twist drill is a  
 a. side cutting tool                      b. front cutting tool  
 c. end cutting tool \*                      d. none of these
90. The obtuse angle, included between the chisel edge and the lip as viewed from the end of a drill, is called  
 a. helix or rake angle \*                      b. point angle  
 c. chisel edge angle                      d. lip clearance angle
91. The angle included between the two lips projected upon a plane parallel to the drill axis and parallel to the two cutting lips, is called helix angle  
 a. Correct                      b. Incorrect \*
92. The lip clearance angle is the angle formed by the  
 a. leading edge of the land with a plane having the axis of the drill  
 b. flank and a plane at right angles to the drill axis \*  
 c. chisel edge and the lip as viewed from the end of a drill  
 d. none of the above
93. The angle formed by the leading edge of the land with a plane having the axis of the drill, is called  
 a. helix or rake angle \*                      b. point angle  
 c. chisel edge angle                      d. lip clearance angle
94. The usual value of the helix angle of a drill is  
 a. 20°                      b. 30° \*  
 c. 45°                      d. 60°
95. The usual value of the point angle of a drill is  
 a. 70°                      b. 100°  
 c. 118° \*                      d. 130°
96. The chisel edge angle of a drill is usually 120° to 135°  
 a. Right \*                      b. Wrong
97. For harder alloy steel, the point angle of the drill is kept  
 a. equal to 118°                      b. less than 118°  
 c. more than 118° \*                      d. any one of these
98. For softer materials, the point angle of the drill is kept  
 a. equal to 118°                      b. less than 118° \*  
 c. more than 118°                      d. any one of these
99. If the helix angle of the drill is made ..... 30°, then the torque required to drive the drill at a given feed will be more  
 a. equal to                      b. less than \*  
 c. more than
100. The rake angle of a single point cutting tool corresponds to ..... of a twist drill.  
 a. lip clearance angle  
 b. helix angle \*  
 c. point angle  
 d. chisel edge angle
101. The lip clearance angle should decrease towards the centre of the drill than at the circumference.  
 a. Yes                      b. No \*
102. In drilling brass, a drill with  
 a. zero helix angle is used  
 b. low helix angle is used \*  
 c. high helix angle is used  
 d. any helix angle can be used

103. In drilling aluminium, a drill with  
 a. zero helix angle is used  
 b. low helix angle is used  
 c. high helix angle is used \*  
 d. any helix angle can be used
104. Low helix angle drills are preferred for drilling holes in  
 a. plastics \*                                b. copper  
 c. cast steel                                d. carbon steel
105. In drilling mild steel and brass, the point angle of a drill is  $118^\circ$   
 a. True \*                                b. False
106. In drilling bakelite and fibrous plastics, the point angle of a drill is  
 a.  $90^\circ$  \*                                b.  $118^\circ$   
 c.  $135^\circ$                                 d.  $150^\circ$
107. The point angle of a drill, for drilling stainless steel, is  
 a.  $90^\circ$                                 b.  $118^\circ$   
 c.  $135^\circ$  \*                                d.  $150^\circ$
108. The helix angle of a drill is more than  $30^\circ$  for drilling aluminium  
 a. Agree \*                                b. Disagree
109. The helix angle of a drill is ..... for drilling brass  
 a. equal to  $30^\circ$                                 b. less than  $30^\circ$  \*  
 c. more than  $30^\circ$
110. Twist drills are made of  
 a. high speed steel                                b. drill power  
 c. drift                                d. drill drawer \*
111. A tool used to withdraw a drill from the sleeve is called  
 a. drill remover                                b. carbon steel  
 c. stainless steel \*                                d. either a. or b.
112. A taper tap has  
 a. its end tapered for about three or four threads  
 b. its end tapered for about eight or ten threads \*  
 c. full threads for the whole of its length  
 d. none of the above
113. When the end of a tap is tapered for about three or four threads, it is known as a  
 a. taper tap                                b. bottoming tap  
 c. second tap \*                                d. none of these
114. A bottoming tap has  
 a. its end tapered for about three or four threads  
 b. its end tapered for about eight or ten threads  
 c. full threads for the whole of its length \*  
 d. none of the above
115. In twist fluted drills, chips do not move out automatically.  
 a. Correct  
 b. Incorrect \*
116. A twist drill is specified by its  
 a. shank, material and diameter \*  
 b. shank, lip angle and size of flute  
 c. material, length of body and helix angle  
 d. any one of these
117. The type of reamer used for reaming operation in a blind hole, is  
 a. straight fluted reamer  
 b. left hand spiral fluted reamer  
 c. right hand spiral fluted reamer \*  
 d. any one of these
118. The type of reamer used for reaming soft aluminium or copper, is  
 a. straight fluted reamer  
 b. left hand spiral fluted reamer \*  
 c. right hand spiral fluted reamer  
 d. any one of these
119. The depth of cut in drilling is ..... the drill diameter  
 a. equal to                                b. one-fourth  
 c. one-half \*                                d. double
120. The cutting speed for drilling aluminium, brass and bronze with high speed steel drills varies from  
 a. 10 to 20 m/min  
 b. 18 to 30 m/min  
 c. 24 to 45 m/min  
 d. 60 to 90 m/min \*
121. The cutting speed for drilling ..... with high speed steel drill is 24 to 45 m/min  
 a. mild steel \*                                b. copper  
 c. aluminium                                d. brass
122. The cutting speed for drilling copper with high speed steel drills varies from  
 a. 10 to 20 m/min                                b. 18 to 30 m/min \*  
 c. 24 to 45 m/min                                d. 60 to 90 m/min
123. The cutting speed for drilling aluminium, brass and bronze with carbon steel drills is ..... cutting speed for drilling mild steel with high speed steel drills  
 a. equal to \*                                b. less than  
 c. more than
124. The cutting speed of a drill varies from point to point on the cutting edge of the drill.  
 a. Right \*                                b. Wrong
125. The cutting speed is zero at the periphery and it is maximum at the centre of the drill.  
 a. Yes                                b. No \*
126. The cutting speed of a drill depends upon the  
 a. material of drill  
 b. type of material to be drilled  
 c. quality of surface finish desired  
 d. all of these \*



147. The grooves made on twist drill are called  
 a. flutes \*                      b. drift  
 c. helix                          d. none of these
148. The drill is held by  
 a. Tang  
 b. Arbor  
 c. shank \*  
 d. none of these
149. The tapered shank drills have taper called  
 a. tang  
 b. morse taper \*  
 c. drift  
 d. none of these
150. The size of taper on any particular drill depends upon  
 a. drill diameter \*  
 b. drill length  
 c. both  
 d. none of these
151. 'Tang' is provided in  
 a. reamer                      b. taps  
 c. drill \*                      d. none of these
152. Drill are made of  
 a. HSS \*                      b. HCS  
 c. CI                          d. none of these
153. Drills are taken out from m/c spindle with help of  
 a. drift \*                      b. tang  
 c. shank                      d. none
154. Cutting angle or angle of lip in case of twist drill is generally  
 a.  $70^\circ$                       b.  $80^\circ$   
 c.  $45^\circ$                       d.  $59^\circ$  \*
155. Wobbling of spindle results due to  
 a. cutting angle is more  
 b. cutting angle is less  
 c. angles on cutting edges are different \*  
 d. all of these
156. Lip clearance angle is provided in twist drill is  
 a.  $12^\circ$ - $15^\circ$  \*              b.  $70^\circ$ - $75^\circ$   
 c.  $20^\circ$ - $25^\circ$               d.  $20^\circ$ - $30^\circ$
157. For drilling soft materials under heavy feeds  
 a. lip clearance angle decreases  
 b. lip clearance angle remains constant  
 c. lip clearance angle increases \*  
 d. none of these
158. For drilling hardest material lip clearance angle is generally  
 a.  $9^\circ$  \*                      b.  $15^\circ$   
 c.  $12^\circ$                       d.  $20^\circ$
159. Rake angle is provided in twist drill generally  
 a.  $80^\circ$ - $85^\circ$               b.  $70^\circ$ - $75^\circ$  \*  
 c.  $60^\circ$ - $70^\circ$               d.  $80^\circ$ - $90^\circ$
160. If rake angle is lesser in case of twist drill  
 a. There will be no edge for cutting  
 b. The cutting is not possible  
 c. The cutting edge is too thin & may break under strain of work \*  
 d. none of these
161. Reamers are used for  
 a. cutting hole  
 b. finishing the hole \*  
 c. threading  
 d. none of these
162. The reamers can remove meta; about  
 a. 0.5-0.75 mm              b. 0.05-0.1 mm \*  
 c. 1-2 mm                    d. 1.5-2.5 mm
163. Hand reamers are usually made of  
 a. cast steel \*              b. cast iron  
 c. mild steel                  d. none of these
164. The angle made by flute with the length of reamer varies (in case of spiral fluted reamers)  
 a.  $8^\circ$ - $12^\circ$                   b.  $12^\circ$ - $15^\circ$   
 c.  $10^\circ$ - $12^\circ$                   d.  $4^\circ$ - $8^\circ$  \*
165. Machine reamers or spiral fluted reamers are generally made of  
 a. cast steel                  b. cast iron  
 c. high speed steel \*      d. mild steel
166. Taps are used for  
 a. cutting threads \*      b. cutting holes  
 c. smoothing the hole    d. none of these
167. Taps are made of  
 a. HCS                      b. HSS  
 c. both of these \*      d. none of these
168. Taper tap has its leading end tapered off for a length of  
 a. 8 - 10 threads \*      b. 10 - 15 threads  
 c. 15 - 20 threads      d. none
169. Tapping size is equal to  
 a. outside diameter - depth of thread  
 b. outside diameter + depth of thread  
 c. outside diameter - 2 X depth of thread \*  
 d. none of these
170. Depth of thread is equal to]  
 a.  $0.64 \times$  pitch of thread \*  
 b.  $0.85 \times$  pitch of thread  
 c.  $0.64$  pitch of thread  
 d. none of these

171. Which tool is used for making internal threads  
 a. dies                                      b. taps \*  
 c. both                                        d. none of these
172. The symmetrical V-Thread in which angle b/w flanks are (By B.S.W)  
 a.  $75^\circ$                                       b.  $45^\circ$   
 c.  $55^\circ$  \*                                      d.  $65^\circ$
173. The types of threads generally used on feed mechanisms of machine tools, valves, spindles, screw jacks etc are  
 a. square thread \*                      b. knuckle thread  
 c. buttress thread                      d. none
174. The threads, frequently used on screw cutting lathes, brass valves, cocks and bench vices are  
 a. knuckle threads                      b. square threads  
 c. acme thread \*                        d. none of these
175. For drilling steel, cast iron, malleable cast iron, brass material, the point angle of drill is  
 a.  $80^\circ$                                         b.  $100^\circ$   
 c.  $118^\circ$  \*                                      d.  $130^\circ$
176. Which type of drill may be considered as a cutting tool having zero rake  
 a. flat or spade drill  
 b. twist drills  
 c. straight fluted drill \*  
 d. none
177. Cutting angle of flat or spade drill varies from  
 a.  $90^\circ$ - $120^\circ$  \*                              b.  $120^\circ$ - $150^\circ$   
 c.  $120^\circ$ - $180^\circ$                               d. none of these
178. In drill specification 'Type N' represents  
 a. hard materials  
 b. soft & tough materials  
 c. normal low C-steel \*  
 d. none of these
179. In drill specification, 'Type - H' represents  
 a. soft & tough materials  
 b. hard materials \*  
 c. normal low C -steel  
 d. none of these
180. In drill specification, "Type S " represents  
 a. hard materials  
 b. normal low C - steel  
 c. soft & tough materials \*  
 d. none of these
181. For high speed drilling and for drilling of hard-to-drill materials, the drills used  
 a. carbide tipped \*  
 b. HSS  
 c. CI  
 d. none of these
182. The threads suitable for fastness are  
 a. triangular thread \*  
 b. saw tooth  
 c. knuckle thread  
 d. none
183. "M 12" represents  
 a. metric thread with 12 mm thread diameter \*  
 b. fine metric thread with 12 mm thread diameter  
 c. both of the above  
 d. none of the above
184. "M 50 X 2" represents  
 a. metric thread 50 mm diameter, 2 mm lead (pitch)  
 b. fine metric thread, 50 mm diameter, 2mm lead (pitch)\*  
 c. both of above  
 d. none of these
185. The pipe thread for sealing purpose has  
 a. larger crest                              b. no crest \*  
 c. lesser crest                              d. none of these
186. The threads which is suitable for moving screws (spindles) is  
 a. trapezoidal thread \*  
 b. pipe thread  
 c. knuckle thread  
 d. none of these
187. In trapezoidal threads, the thread angle is  
 a.  $29^\circ$                                         b.  $30^\circ$  \*  
 c.  $55^\circ$                                         d.  $60^\circ$
188. Which thread is used for valve spindles, railway couplings, hose connections etc  
 a. trapezoidal thread  
 b. saw tooth thread  
 c. knuckle thread \*  
 d. none of these
189. '4 - 28 ' thread indicates  
 a. 1/4 inch diameter bolt has 28 threads in 1 inch of its threaded length \*  
 b. 4 mm dia bolt has 28 threads  
 c. both of above  
 d. none of these
190. 'Class 1 ' is designated for  
 a. loose fit \*                                b. free fit  
 c. medium fit                                d. close fit
191. 'Class 2 ' is designated for  
 a. loose fit                                      b. free fit \*  
 c. medium fit                                d. close fit
192. 'Class 3 ' is designated for  
 a. loose fit  
 b. medium fit \*  
 c. close fit  
 d. free fit

193. 'Class 4 ' is designated for
- a. loose fit
  - b. close fit \*
  - c. medium fit
  - d. free fit
194. Aircraft bolts are almost always manufactured in
- a. class 1
  - b. class 2
  - c. class 3 \*
  - d. class 4
195. Which class fit can easily be turned with the fingers
- a. class-1 \*
  - b. class-2
  - c. class-3
  - 4. class-4
196. Aircraft screws are manufactured with class.....  
thread fit for case of assembly
- a. class-2 \*
  - b. class-1
  - c. class-3
  - d. class-4
197. All aircraft bolts & nuts have
- a. right hand thread \*
  - b. left hand thread
  - c. both
  - d. none of these





# CHAPTER - 6

## KNOWLEDGE OF HARDNESS TESTING MACHINES AND VARIOUS TYPES OF HARDNESS NUMBERS

1. Mohs scale of hardness is an arbitrary one which is used to describe the hardness of several mineral substances on a scale of
  - a. 1 through 5
  - b. 1 through 10 \*
  - c. 1 through 25
  - d. 1 through 50
  - e. 1 through 100
2. In Vickers method of hardening testing, the indenter, is a diamond in the form of a square pyramid with an apical angle of  $136^\circ$ . If  $P$  be the impressed load in kg and  $d$  the diagonal of indentation in mm, then Vickers hardness number is
  - a.  $P/0.5393d^*$
  - b.  $P/d^2$
  - c.  $P/\pi d^2$
  - d.  $\pi r/d$
  - e.  $0.5393P/d$
3. Work hardenability of a material can be determined by
  - a. Rockwell hardness test
  - b. Vickers pyramid test
  - c. Scleroscope
  - d. Herbert pendulum \*
  - e. Brinell hardness
4. Brinell hardness of around 240 is possible with following carbon steel
  - a. C 50 \*
  - b. C 45
  - c. C 40
  - d. C 35
  - e. C 30
5. For lower Brinell hardness number (170-78) the following corresponding Rockwell number is applicable
  - a. A
  - b. B \*
  - c. C
  - d. D
  - e. E
6. The hardness of a material can be defined as
  - a. how easily it can be scratched
  - b. how resistant it is to wear
  - c. how difficult it is to mark the surface with a centre punch
  - d. hardness is an indication of the way in which the surface of a material deforms under specific types of localised loading \*
  - e. how much the rubber ball rebounds back after striking the surface
7. The main attraction in measuring hardness is that
  - a. it is a useful non-destructive indicator of strength\*
  - b. it can be measured quickly
  - c. all other properties can be predicated by measure of hardness
  - d. measurement of hardness can be done in-situ
  - e. it is the index of quality of metal
8. In the Rockwell hardness test, the depth of indentation is measured
  - a. by a scale
  - b. under a microscope
  - c. by micrometer screw gauge
  - d. directly by a dial gauge \*
  - e. by a feeler gauge
9. The loads applied with a diamond indenter on specimen in case of Rockwell C hardness measurement respectively are
  - a. 100 kgf and 150 kgf \*
  - b. 50 kgf and 100 kgf
  - c. 100 kgf and 200 kgf
  - d. 150 kgf and 250 kgf
  - e. 150 kgf and 100 kgf
10. In Rockwell test for hardness on B scale
  - a. A steel ball is used \*
  - b. A diamond cone is used
  - c. A steel hammer is used
  - d. A plastic hammer is used
  - e. A mechanite ball is used.
11. In case of very hard surfaces the Brinell Hardness test method fails to give reliable results because
  - a. Ball does not force into the metal
  - b. Ball deforms on very hard surfaces \*
  - c. Ball slips along the surface
  - d. It is generally not desired to use this method in such cases
  - e. None of the above.
12. In a Brinell hardness test the hardness number is determined by the measurement of
  - a. Width of depression
  - b. Depth of depression
  - c. Diameter of depression
  - d. Surface area of depression \*
  - e. None of the above.
13. In Rockwell hardness test the hardness is measured by
  - a. The width of depression
  - b. The depth of depression \*
  - c. Diameter of depression
  - d. None of the above.
14. Which of the following statements correct ?
  - a. Rockwell scale B is used for hard metals
  - b. Rockwell scale C is used for hard metals \*
  - c. Rockwell scale C is used for soft metals
  - d. Rockwell scale A is used for hard metals.

15. Metal hardness determines its
  - a. resistance to scratching, wear and penetration
  - b. resistance to machinability
  - c. ability to cut
  - d. all (a), (b) and (c) \*
16. Brinell and Vickers hardness values are almost identical upto a hardness of
 

a. 60	b. 130
c. 235	d. 300 *
17. In which of the hardness tests, the height of first rebound of a hammer being dropped freely is taken as the index of hardness ?
  - a. Rockwell and brinell tests
  - b. Vickers test
  - c. Shore test \*
  - d. none of these
18. Hardness of a material determines the resistance of materials to
  - a. scratching
  - b. wear and indentation
  - c. machinability
  - d. all (a), (b) and (c) \*
19. Brinell Hardness Number (BHN) of annealed aluminium sheet may be about
 

a. 20 *	b. 200
c. 300	d. 400
20. The dia of ball in BHN test for steel and other hard materials is.....mm.
 

a. 5	b. 10 *
c. 25	d. 50
21. The load applied in BHN test is
  - a. 100 kg
  - b. 1000 kg
  - c. 3000 kg \*
  - d. different for soft and hard materials
22. The dia of ball in BHN test for soft metals (e.g. AL, Cu, etc.) is .....mm.
  - a. 5 \*
  - b. 10
  - c. 20
  - d. 40
23. The time of loading in BHN test is
  - a. 1 second
  - b. 15 seconds \*
  - c. 5 minutes
  - d. not specified, it can be any thing between 30 to 45 minutes
24. The thickness of the test specimen in BHN test should not be less than.....times the depth of impression
 

a. two	b. five
c. seven	d. ten *
25. Piling up of metal round the edge of impression in BHN test indicates
  - a. strong capacity for strain hardening
  - b. low capacity for hardening by deformation \*
  - c. high ductility of metal
  - d. its inability to be cold worked
26. Tensile strength of steel in ton/inch<sup>2</sup> is obtained by multiplying the BHN by
 

a. 0.002	b. 0.22 *
c. 22	d. 2200
27. BHN test gives erratic result, when the
  - a. piling up of metal round the edge of impression occurs
  - b. sinking of metal round the edge of impression occurs
  - c. hardness of material under test is equal to or more than the hardness of Brinell steel ball itself \*
  - d. none of these
28. The depth of indentation of BHN test should be.....the thickness of the test piece
 

a. < 1/10th of*	b. twice
c. just less than	d. just more than
29. Centre of indentation of BHN test should not be.....its diameter from the edge of the test piece
 

a. < 2.5 times *	b. < 2.5 times
c. less than	d. none of these
30. Applications of Brinell test include
  - a. rapid control of chemical carbon determination during iron and steel making
  - b. examining the effect of heat treatment
  - c. examining the effect of cold working
  - d. all (a), (b) and (c) \*
31. Vicker's Pyramid method which measures hardness as Vicker's Pyramid Number (VPN) employs a
  - a. diamond pyramid indenter
  - b. load of 30 kg
  - c. both (a) and (b) \*
  - d. neither (a) nor (b)
32. The distinguishing feature between the Vicker's diamond pyramid method and brinell hardness method is that the former
  - a. is used for soft materials only
  - b. is used for very hard materials only
  - c. gives a square impression at the surfaces whereas the latter gives a circular one \*
  - d. none of these
33. Vicker's diamond pyramid method of hardness determination does not give accurate result in case employed for
  - a. polished and hardened steel surfaces
  - b. rough forging or heterogeneous materials like grey cast iron \*
  - c. soft materials
  - d. hard materials

34. Rockwell hardness test is useful for  
 a. only soft materials  
 b. only hard materials  
 c. rapid routine tests on finished products \*  
 d. none of these
35. BHN of a high speed steel is 650. Its hardness in VPN may be about  
 a. 250  
 b. 400  
 c. 600  
 d. 750 \*
36. In which of the hardness tests, the height of rebound of a small diamond pointed hammer is taken as the index of hardness ?  
 a. Rockwell's test  
 b. Brinell's test  
 c. Vicker's test  
 d. Shore test \*
37. For steels, shore hardness value multiplied by.....gives roughly the BHN.  
 a. 2  
 b. 6 \*  
 c. 40  
 d. 0.1
38. Izod value of material is the measure of its  
 a. hardness  
 b. impact resistance \*  
 c. creep strength  
 d. none of these
39. The ability of a material to withstand suddenly applied loads is called its  
 a. hardness  
 b. impact resistance \*  
 c. creep strength  
 d. none of these
40. Detection of faulty heat treatment of metals can be best done by  
 a. Brinell's test  
 b. Vicker's test  
 c. Izod impact test \*  
 d. Rockwell's test
41. In aircraft construction it is essential that material used should have \_\_\_\_\_ strength/weight ratio.  
 a. low  
 b. high \*  
 c. medium  
 d. intermediate
42. Which of the following is a definite indication of the maximum applied load  
 a. yield strength \*  
 b. tensile strength  
 c. stress  
 d. strain
43. The testing machines should be sensitive to a variation of \_\_\_\_\_ of any resistive load.  
 a. 1/250 \*  
 b. 1/150  
 c. 1/125  
 d. 1/260
44. The aircraft testing machines should be accurate to within \_\_\_\_\_ throughout its range.  
 a.  $\pm 1\frac{1}{2}\%$  \*  
 b.  $\pm 3\frac{1}{2}\%$   
 c.  $\pm 2\frac{1}{2}\%$   
 d.  $\pm 4\frac{1}{2}\%$
45. The speed of the testing machine cross head should not exceed \_\_\_\_\_ per inch of gauge length.  
 a. 1/16 inch \*  
 b. 1/14 inch  
 c. 1/5 inch  
 d. 1/6 inch
46. For a 2 inch gage length the speeds should be \_\_\_\_\_ per minute / per inch.  
 a. 1/8 inch \*  
 b. 1/4 inch  
 c. 1/12 inch  
 d. 1/5 inch
47. When using extensio meter to determine the elastic limit or the field strength the cross head speed should not exceed \_\_\_\_\_ inch / per minut.  
 a. 0.025 \*  
 b. 0.015  
 c. 0.005  
 d. 0.028
48. The extensometer must be calibrated to read \_\_\_\_\_ inch or less.  
 a. 0.0002 \*  
 b. 0.002  
 c. 0.02  
 d. 0.0004
49. Radiography is a \_\_\_\_\_ method of locating cracks by means of X-rays or gamma rays.  
 a. destructive  
 b. non-destructive \*  
 c. creative  
 d. sensitive
50. The following is a magnetic powder  
 a. black iron oxide  
 b.  $\text{Fe}_3\text{O}_4$   
 c.  $\text{Ca}_2\text{O}$   
 d. both a. and b. \*
51. Materials subject to vibrational stresses have frequently failed at much \_\_\_\_\_ loads than anticipated.  
 a. smaller \*  
 b. higher  
 c. reduces  
 d. none of the above
52. In practical testing the elastic limit is considered to have been reached when a permanent set of \_\_\_\_\_ inch per inch of gauge length has been obtained.  
 a. 0.00003 \*  
 b. 0.003  
 c. 0.03  
 d. 0.000003
53. Which of the following loads are selected for set method.  
 a. 20% \*  
 b. 16%  
 c. 15%  
 d. 10%
54. Which of the following loads are selected for the set method  
 a. 75% \*  
 b. 55%  
 c. 65%  
 d. 85%
55. Which of the following loads are selected for the set method  
 a. 65%  
 b. 85%  
 c. 55%  
 d. 90% \*
56. Which of the following loads are not selected for the set method  
 a. 20%  
 b. 75%  
 c. 90%  
 d. 80% \*

57. The following is/are the methods for determining the stress are known as  
 a. set method  
 b. extension under load method  
 c. both a. or b. \*  
 d. either a. or b.
58. Which method is frequently specified for determining the yield strength  
 a. set method \*  
 b. extension under load method  
 c. either a. or b.  
 d. both a. or b.
59. Which of the following metals yield strength is often determined as the point where a permanent set of 0.002 inch per inch of gage length is obtained.  
 a. steel  
 b. aluminium alloys  
 c. magnesium  
 d. all of the above \*
60. Modulus of elasticity of which of the following metals is highest  
 a. steel \*  
 b. aluminium alloys  
 c. magnesium  
 d. corrosion resisting steel
61. Modulus of elasticity of which of following metals is lowest  
 a. steel  
 b. aluminium alloys  
 c. magnesium \*  
 d. corrosion resisting steel
62. Modulus of elasticity of steel is  
 a.  $30 \times 10^6 \text{ lb/inch}^2$  \*  
 b.  $25 \times 10^5 \text{ lb/inch}^2$   
 c.  $20 \times 10^4 \text{ lb/inch}^2$   
 d.  $15 \times 10^3 \text{ lb/inch}^2$
63. Modulus of elasticity of aluminium alloys  
 a.  $10 \times 10^6 \text{ lb/inch}^2$  \*  
 b.  $15 \times 10^6 \text{ lb/inch}^2$   
 c.  $25 \times 10^6 \text{ lb/inch}^2$   
 d.  $35 \times 10^6 \text{ lb/inch}^2$
64. Modulus of elasticity of magnesium  
 a.  $65 \times 10^5 \text{ lb/inch}^2$  \*  
 b.  $55 \times 10^5 \text{ lb/inch}^2$   
 c.  $35 \times 10^5 \text{ lb/inch}^2$   
 d.  $75 \times 10^5 \text{ lb/inch}^2$
65. Modulus of elasticity of corrosion-resisting steel is  
 a.  $25 \times 10^6 \text{ lb/inch}^2$  \*  
 b.  $15 \times 10^6 \text{ lb/inch}^2$   
 c.  $10 \times 10^6 \text{ lb/inch}^2$   
 d. none of the above
66. Magnaflux is an \_\_\_\_\_ process.  
 a. inspection \*  
 b. creation  
 c. corrosion  
 d. manufacturing
67. Which of the following process indicates cracks, seams, laps and non-metallic inclusions  
 a. magnaflux \*  
 b. normalizing  
 c. annealing  
 d. anodizing
68. To locate a defect it is essential that the magnetic lines of force pass approximately \_\_\_\_\_ to the defect.  
 a. parallel  
 b. perpendicular \*  
 c. horizontal  
 d. vertical
69. It is essential that all parts of the airplane structure be free from \_\_\_\_\_.  
 a. cost  
 b. crack \*  
 c. dirt  
 d. dust
70. For steel the fatigue limit is about \_\_\_\_\_ of the ultimate tensile strength.  
 a. 0.5 \*  
 b. 0.4  
 c. 0.2  
 d. 0.3
71. The fatigue limit of non-ferrous metals is about  
 a. 0.3 to 0.4 \*  
 b. 0.2 to 0.6  
 c. 0.4 to 0.7  
 d. 0.5 to 0.9
72. Which materials have higher tensile strengths and fatigue limits  
 a. annealed materials  
 b. heat treated materials \*  
 c. both have same  
 d. none of the above
73. Flattening test is a/an  
 a. bending test \*  
 b. impact test  
 c. torsion test  
 d. inspection test
74. Izod test is a/an  
 a. bending test  
 b. impact test \*  
 c. torsion test  
 d. inspection test
75. Charpy test is a/an  
 a. bending test  
 b. impact test \*  
 c. torsion test  
 d. inspection test
76. Impact test is a  
 a. static test  
 b. dynamic test \*  
 c. torsional test  
 d. none of the above
77. The specimen selected for impact test is  
 a. machined on surface  
 b. ground on surface  
 c. usually notched  
 d. prepared as per a., b. and c. \*
78. The impact blow on specimen is delivered by  
 a. a dropping weight  
 b. a swinging pendulum  
 c. a rotating flywheel  
 d. all above \*
79. In impact test, the specimen is required to be ruptured under a  
 a. single blow \*  
 b. repeated blow  
 c. either of the above  
 d. none of the above
80. In izod impact machine, the dynamic load is in the form of  
 a. a dropping weight  
 b. a swinging pendulum \*  
 c. a rotating fly wheel  
 d. none of the above

81. In izod impact test, state which is true:  
 a. specimen is notched  
 b. specimen is supported cantilever  
 c. the fracture is of brittle type  
 d. all above are true \*
82. For the swinging pendulum, the kinetic energy is determined from the  
 a. weight of the mass  
 b. vertical distance through which the mass falls  
 c. both a. and b. are correct \*  
 d. none of the above
83. Usually metals fail when subjected to  
 a. repeated loading and unloading \*  
 b. reverse stresses  
 c. just loading  
 d. all above stresses and strains
84. As the number of cycles of stresses increases, the magnitude of the stress at failure  
 a. increases                      b. decreases \*  
 c. remains constant      d. any of the above
85. A test performed on a specimen subjecting it to different cycles of stress and their resistance noted is called a :  
 a. endurance test      b. fatigue test  
 c. either of the above \*      d. none of the above
86. The harness can be defined in various ways according to the work for which the metal has to perform  
 a. rebound hardness and machinability  
 b. scratch hardness and wear hardness  
 c. indentation hardness  
 d. all above \*
87. The Brinell test is the  
 a. rebound hardness test      b. wear hardness test  
 c. indentation test \*      d. all above
88. For hard metals, the Brinell test is carried out with a ball of 10 mm diameter and a load of  
 a. 3000 kg \*                      b. 1500 kg  
 c. 500 kg                          d. 100 kg
89. For soft material, the Brinell test is carried out with load as low as  
 a. 50 kg                              b. 100 kg \*  
 c. 150 kg                              d. 75 kg
90. Various type of machines are available for the Brinell test, they may differ as to  
 a. method of loading  
 b. method of operation and size  
 c. method of measuring load  
 d. all above \*
91. In a typical, hydraulically operated, Brinell testing machine :  
 a. The specimen is placed on anvil  
 b. Pressure is applied by pumping oil  
 c. Indication of load is by bourdon gauge  
 d. consists of all above \*
92. In a hydraulically operated Brinell testing machine, balanced weights are provided to ensure that  
 a. Excessive load is applied  
 b. Overload is not applied \*  
 c. Gradual load is applied  
 d. None of the above happens
93. While hardness test is carried out on very hard steels it is required that ball should not show a permanent change of more than 0.1 mm, hence :  
 a. Iron carbide balls are used \*  
 b. Tungsten carbide balls are used  
 c. Manganese carbide balls are used  
 d. any of the above is used
94. To obtain the good results from Brinell test, the precautions to be taken are  
 a. not to be adopted for extreme hard materials  
 b. not to be adopted for very thin materials  
 c. not to be adopted for low carbon steel  
 d. as per a. and b.\*
95. To carry out torsion test, the one end of the specimen is fixed in jaw and  
 a. other end is twisted with respect to fixed end \*  
 b. the rapid load is applied axially  
 c. the gradual and axial load is applied  
 d. a. and c. are performed
96. Mechanical test may be conducted under various loading conditions i.e.  
 a. static                              b. dynamic  
 c. repeated or fatigue      d. all above \*
97. To select the material to manufacture any item, the specimen is subjected to testing of desired characteristics, i.e.  
 a. tension, compression and impact  
 b. fatigue, hardness and torsion test  
 c. as many of the above \*  
 d. none of the above
98. Tension and compression test are carried out by providing  
 a. static loads \*                      b. dynamic loads  
 c. repeated loads                      d. any of the above
99. Various type of tension and compression testing are available as per the suitability of particular laboratory. But :  
 a. the essential principle of application of load is the same  
 b. different machines may differ in the way the load is applied  
 c. all have provisions to measure and vary the load and recording instruments  
 d. all above is correct \*
100. The testing specimens for compression testing are as  
 a. circular in cross section  
 b. as short as possible  
 c. of constant cross section  
 d. all above \*

101. The specimen for tensile test, before being put in the machine, is marked with two marks for "gauge length", which is usually :
- 1"
  - 2" \*
  - 3"
  - 1½"
102. An instrument called extenso-meter is attached to the specimen to measure :
- Compression
  - Elongation \*
  - Distortion
  - All of the above
103. During tensile test stress can be read on dial and strain can be found out, since
- elongation is known
  - original gauge length is known
  - the overall length of specimen is known
  - elongation and gauge length is known \*
104. The compressibility of a substance is proportional to
- the Poisson's ratio
  - the modulus of elasticity
  - the reciprocal of the modulus of elasticity
  - the bulk modulus of elasticity
  - the reciprocal of the bulk modulus of elasticity \*
105. Which of the following metals has the greatest specific gravity
- zinc
  - lead
  - iron
  - mercury \*
  - nickel
106. Material with maximum density is
- lead
  - osmium \*
  - uranium
  - tungsten
  - titanium
107. Toughness of a material can be measured with the help of
- Vickers pyramid hardness test
  - universal testing machine \*
  - notched-bar tests
  - standard spiral tests
  - scratch test
108. Lack of toughness in material is usually referred to as
- ductility
  - brittleness \*
  - malleability
  - plasticity
  - hardness
109. The Rockwell number refers to a material's
- malleability
  - toughness
  - piezo-electric constant
  - plasticity
  - hardness \*
110. The property of steel that makes it suitable for use in cable is its strength in
- compression
  - tension \*
  - shear
  - torsion
  - bending
111. Which of the following is not the function of annealing
- to remove stresses and gases
  - to induce softness
  - to alter ductility, toughness, electrical, magnetic or other physical properties
  - to refine the crystalline structure and produce a definite microstructure
  - to act as a treatment to precede further wire drawing\*



# CHAPTER - 7

## KNOWLEDGE OF VARIOUS TYPES OF AIRCRAFT CABLES AND SWAGING PROCEDURES USED

1. For general electrical use in aircraft, the acceptable method of attaching a terminal to a wire is by
  - a. crimping.\*
  - b. soldering.
  - c. crimping and soldering.
2. Which of the following factors must be taken into consideration when determining the wire size to use for an aircraft installation?
  1. Mechanical strength
  2. Allowable power loss.
  3. Ease of installation.
  4. Resistance of current return path through the aircraft structure.
  5. Permissible voltage drop.
  6. Current carrying capability of the conductor.
  7. Type of load (conditions of intermittent).
    - a. 1, 2, 4, 5.
    - b. 2, 4, 6, 7.
    - c. 2, 5, 6, 7.\*
3. When selecting hardware for attaching bonding connections to an aircraft structure, which of the following should be considered?
  1. Mechanical strength.
  2. Allowable power loss.
  3. Ease of installation.
  4. Permissible voltage drop.
  5. Amount of current to be carried.
    - a. 1, 3, 5.\*
    - b. 1, 2, 3.
    - c. 4, 5, 6.
4. How should the splices be arranged if several are to be located in an electrical wire bundle?
  - a. Enclosed in a conduit.
  - b. Grouped together to facilitate inspection.
  - c. Staggered along the length of the bundle.\*
5. What is the minimum bend radius for an electrical wire bundle?
  - a. Ten times the outside diameter of the bundle.\*
  - b. Fifteen times the outside diameter of the bundle.
  - c. Five times the outside diameter of the bundle.
6. When approved, splices may be used to repair manufactured harnesses or installed wiring. The maximum number of splices permitted between any two connectors is
  - a. three.
  - b. two.
  - c. one.\*
7. AN/MS electrical connectors are specifically designed to meet
  - a. International Civil Aviation Organization (ICAO) standards.
  - b. Technical Standard Order (TSO) specifications.
  - c. military specifications.\*
8. The most common method of attaching a pin or socket to an individual wire in an MS electrical connector is by
  - a. crimping and soldering.\*
  - b. crimping.
  - c. soldering.
9. The pin section of an AN/MS connector is normally installed on
  - a. either side of a circuit (makes no difference).
  - b. the ground side of a circuit.\*
  - c. the power supply side of a circuit.
10. In several long lengths of electrical cable are to be installed in rigid conduit, the possibility of damage to the cable as it is pulled through the conduit will be reduced by
  - a. applying a light coat of dielectric grease.
  - b. dusting the cable with powdered graphite.
  - c. dusting the cable with powdered soapstone.\*
11. Grounding is electrically connecting a conductive object to the primary structure. One purpose of grounding is to
  - a. prevent development of radio frequency potentials.\*
  - b. prevent current return paths.
  - c. allow static charge accumulation.
12. What is normally used to bond noncontinuous stainless steel aircraft components?
  - a. Aluminum jumpers.
  - b. Stainless steel jumpers.
  - c. Copper jumpers.\*
13. Aircraft fuse capacity is rated in
  - a. volts.
  - b. amperes.\*
  - c. ohms.
14. Electric wiring installed in aircraft without special enclosing means (open wiring) offers the advantages of ease of installation, simple maintenance, and reduced weight. When bundling open wiring, the bundles should
  - a. be limited as to the number of cables to minimize damage from a single electrical fault.\*
  - b. include at least one shielded cable to provide good bonding of the bundle to the airframe.
  - c. be limited to a minimum bend radius of five times the bundle diameter to avoid excessive stresses on the cable insulation.

15. How does the routing of coaxial cables differ from the routing of electrical wiring?
- Coaxial cables are routed parallel with stringers or ribs.
  - Coaxial cables are routed as directly as possible.\*
  - Coaxial cables are routed at right angles to stringers or ribs.
16. Which of the following copper electrical cable sizes should be selected to replace a No. 6 aluminum electrical cable?
- No. 6
  - No. 8.\*
  - No. 4.
17. Which statement relating to electric wiring is true?
- When attaching a terminal to the end of an electric cable, it should be determined that the strength of the cable to terminal joint is at least twice the tensile strength of the cable.
  - All electric cable splices should be covered with soft insulating tubing (spaghetti) for mechanical protection against external abrasion.
  - When attaching a terminal to the end of an electric cable, it should be determined that the strength of the cable to terminal joint is at least equal to the tensile strength of the cable itself.\*
18. Bonding connections should be tested for
- reactance.
  - amperage value.
  - resistance value.\*
19. If a wire is installed so that it comes in contact with some moving parts, what protection should be given the wire?
- Wrap with friction tape.
  - Pass through conduit.\*
  - Wrap with soft wire solder into a shield.
20. In the American Wire Gauge (AWG) system of numbers used to designate electrical wire sizes, the number assigned to a size is related to its
- cross sectional area.\*
  - combined resistance and current carrying capacity.
  - current carrying capacity.
21. Where electric cables must pass through holes in bulkheads, formers, ribs, firewalls, etc., the wires should be protected from chafing by
- wrapping with electrical tape.
  - using a suitable grommet.\*
  - wrapping with plastic.
22. The tensile strength of carbon steel in kg/mm<sup>2</sup> can be approximately expressed in relation to BHN as follows
- 0.23 BHN
  - 0.35 BHN \*
  - 0.45 BHN
  - 0.55 BHN
  - 0.75 BHN
23. The control systems commonly used are
- push pull
  - torque tube
  - cable
  - all of these \*
24. Cable linkage is used in
- Engine controls
  - emergency extension systems for the landing gear
  - both of above \*
  - none of these
25. Conventional cable assembly consists of
- flexible cable
  - terminals (end fittings)
  - Turn buckles
  - all of these \*
26. Cable tension must be adjusted frequently because of
- stretching
  - temperature changes
  - both of these \*
  - none of these
27. Aircraft cables are fabricated from
- carbon steel
  - stainless steel
  - both of these \*
  - none of these
28. Terminals for aircraft-control cables are normally fabricated by
- swaging
  - micropress
  - handwoven splice terminal
  - all of these \*
29. The process used in many older aircraft
- hand woven splices terminal \*
  - swaging
  - micropress process
  - none of these
30. The process used in all modern aircraft is
- swaging \*
  - handwoven splices
  - micropress process
  - none of these
31. All the manufacturers instructions include in case of swaging
- 'Go' dimension
  - No-Go dimension
  - both of these \*
  - none of these
32. To make a satisfactory copper sleeve installation, it is important that the amount of sleeve pressure be kept
- uniform \*
  - more
  - less
  - none of these



33. Turn buckles consist of  
 a. 2-threaded termicals  
 b. one threaded barrel  
 c. both of these \*  
 d. none of these
34. Turn buckles are fitted in the cable assembly for the purpose of making minor adjustments in  
 a. cable length  
 b. cable tension  
 c. both of these \*  
 d. none of these
35. The barrel has matching internal threads are  
 a. right-handed  
 b. left-handed \*  
 c. both of these  
 d. none of these
36. The end of the barrel with the left-handed threads can usually be identified by  
 a. groove  
 b. knurl  
 c. either a or b \*  
 d. none of these
37. The methods of safetying turn buckles are  
 a. clip locking  
 b. wire wrapping method  
 c. both of these \*  
 d. none of these
38. In modern aircraft, the saftying turn buckles method is  
 a. clip-locking \*  
 b. wire-wrapping  
 c. both of these  
 d. none of these
39. The older aircraft, the safetying turn buckles method is  
 a. clip-locking                      b. wire-wrapping \*  
 c. both of above                    d. none of these
40. In wire-wrapping method, the preferred method is  
 a. single-wrap                      b. double-wrap \*  
 c. triple-wrap                        d. none of these
41. The ends of wire are bent toward  
 a. opposite ends of wire \*  
 b. same ends of wire  
 c. both ends of wire  
 d. none of the above
42. The laid wires are bent in place  
 a. before cutting off the wrapped wire \*  
 b. after cutting off the wrapped wire  
 c. any of both  
 d. none of these
43. The remaining length of safety wire is wrapped at least  
 a. 4 - turns around the shank \*  
 b. 6 - turns around the shank  
 c. 8 - turns around the shank  
 d. none of these
44. The wire should be passed through the hole & looped over the  
 a. free end of other wire \*  
 b. fixed end of wire  
 c. both of these  
 d. none of these
45. To ensure satisfactory service, the wire should be inspected at regular intervals for  
 a. abrasions  
 b. defective insulations  
 c. corrosion & condition of terminal posts  
 d. all of these \*
46. Abbreviation of AWG  
 a. Association of wire gauge  
 b. Amercian wire gauge \*  
 c. Aluminum wire gauge  
 d. none of these
47. The wire diameters become smaller as the gauge numbers become  
 a. smaller  
 b. larger \*  
 c. constant  
 d. none of these
48. The gauge number corresponding to that slot indicates the  
 a. wire size  
 b. wire diameter  
 c. strands in wire  
 d. both a & b \*
49. Large wires are usually stranded to increase their  
 a. flexibility \*  
 b. rigidity  
 c. both a & b  
 d. none of these
50. Most generally used conductors are  
 a. copper \*  
 b. aluminum  
 c. both of these  
 d. none of these
51. Copper has advantages as  
 a. higher conductivity  
 b. more ductile & relatively high tensile strength  
 c. easily soldered  
 d. all of these \*

52. Copper is in comparison of Aluminium, Copper is
- more expensive
  - more expensive & heavier \*
  - less expensive & lighter
  - heavier
53. Aluminium has conductivity comparison to that of copper is
- 60% \*
  - 80%
  - 70%
  - none of these
54. Discharge is greater when small diameter is used than when the wire used is
- large diameter \*
  - longer wire
  - both 'a' & 'b'
  - none of these
55. Some bus bars are made of aluminium instead of copper, where there is a
- lesser radiating surface for same conductance
  - greater radiating surface for the same conductance \*
  - both 'a' & 'b'
  - none of the above
56. Conductor insulation material extensively used in today's aircraft systems are
- rubber
  - silk
  - cotton \*
  - paper
57. More common insulation materials used in today's aircrafts are
- teflon
  - nylon
  - rockbestos
  - all of these \*
58. Stripping is defined as
- attaching the wire to connectors or terminals requires the removal of insulation to expose the conductors \*
  - attaching the wire to connectors or terminals requires the covering of insulation to cover the conductors
  - to covered the insulation on terminals
  - none of these
59. Terminals are attached to the ends of electric wires to facilitate connection of
- wires to terminal strips
  - items of equipment
  - either 'a' or 'b' \*
  - none of these
60. A haphazard choice of commercial terminals can contribute to
- overheated joints
  - vibration failures
  - corrosion difficulties
  - all of these \*
61. For most applications, soldered terminals have been replaced by
- solderless terminals \*
  - brazed terminals
  - both a & b
  - none of these
62. The crimping or swaging tool for
- joining the solderless terminal to electric wire \*
  - joining the soldered terminals to electric wire
  - both a & b
  - none of these
63. In crimping process the oxide coating must be
- coated
  - broken down \*
  - both a & b
  - none of these
64. Preinsulated terminal lugs contain
- insulation grip \*
  - barrel
  - tongue
  - none of these
65. The insulation is usually color-coded to
- resistant from corrosion
  - identify the wire sizes \*
  - get better visibility
  - none of these
66. Transparent flexible tubing called
- sleeves \*
  - plates
  - pipes
  - none of these
67. At connection, sleeve provides
- electrical protection
  - mechanical protection
  - both of above \*
  - either a or b
68. The use of Aluminum wire in aircraft systems is increasing because of its
- strength
  - ductility
  - weight \*
  - all of these
69. Work hardening of metal causes
- ductility
  - brittleness \*
  - rigidity
  - none of these
70. Only Aluminum terminal lugs are used to terminate
- Aluminum wires \*
  - copper wires
  - both of these
  - none of these

71. The petroleum - zinc dust compound removes  
 a. oxidefilm  
 b. minimize oxidation  
 c. moisture & air  
 d. all of these \*
72. The compound is retained inside the terminal lug barrel by  
 a. plastic  
 b. foil seal at end of barrel  
 c. either a or b \*  
 d. none of these
73. Terminal lugs should be installed on terminal blocks so that they are locked against movement in the direction of  
 a. loosening \*                      b. tightening  
 c. both of these                      d. none of these
74. Terminal blocks are normally supplied with studs secured in place by  
 a. a plain washer  
 b. an external tooth lock washer  
 c. nut  
 d. all of the above \*
75. Aluminum terminal lugs should be placed over a plated  
 a. brass plain washer \*  
 b. copper plain washer  
 c. elastic stop nut  
 d. none of these
76. The plated brass washer should have a diameter  
 a. more than tongue width of Aluminum terminal lug  
 b. equal to the tongue width of the Aluminum terminal lug \*  
 c. lesser than tongue width of Aluminum terminal lug  
 d. none of the above
77. The current path b/w two Aluminum terminal lug or b/w two copper terminal lugs, the number of washer should be placed as  
 a. 1                                      b. 0 \*  
 c. 2                                      d. all of these
78. The number of lock washer should be placed against the tongue or pad of the Aluminum channel as  
 a. 0 \*                                      b. 1  
 c. 2                                      d. 3
79. Aircraft electrical system wiring & cable can be marked with  
 a. letters  
 b. numbers  
 c. combination of both a & b \*  
 d. none of these
80. Wires are usually marked at internals of not more than  
 a. 15" lengthwise & within 3" of each junction or terminating point \*  
 b. 3" lengthwise & within 15" of each junction or terminating point  
 c. 5" lengthwise & within 10" of each junction or terminating point  
 d. none of these
81. Slack b/w supports should normally not exceed a maximum of  
 a. ½" deflection with normal hand force \*  
 b. 1" deflection with normal hand force  
 c. 1½" deflection with normal hand force  
 d. none of these
82. 7 X 19 consists of  
 a. 7 strands, each strand containing 19 wires \*  
 b. 19 strands, each strand containing 7 wires  
 c. both a & b  
 d. none of these
83. Wire are wound round  
 a. a king wire in one or two layers \*  
 b. a core strand in one layer  
 c. both a & b  
 d. none of these
84. Strands are wound around  
 a. a king wire in one or two layers  
 b. a core strand in one layer \*  
 c. both a & b  
 d. none of these
85. A kink is shown by  
 a. the core strand leaving the centre of rope  
 b. lying b/w the outer strands or protruding in the form of a small loop  
 c. both a & b \*  
 d. none of these
86. The diameter of the reel barrel should be at least  
 a. 50 times the cable diameter  
 b. 40 times the cable diameter \*  
 c. 30 times the cable diameter  
 d. all of these
87. Precautions should be taken to protect the cable from  
 a. grit & moisture  
 b. from damage in transit  
 c. both of a & b \*  
 d. none of these
88. The mounting screw should be  
 a. above the wire bundle \*  
 b. below wire bundle  
 c. both a & b  
 d. none of these

89. Clamps can be used with rubber cushions to
- sustain load
  - secure wire bundles to tubular structures \*
  - for proper mounting
  - none of these
90. Damage to the insulation can cause
- short circuits
  - malfunction
  - inadvertent operation of equipment
  - all of these \*
91. Grounding is the electrical connecting of a conducting object to the primary structure for a
- return path for current \*
  - forward path for current
  - both a & b
  - none of these
92. Primary structure is the main frame, fuselage, or wing structure of the aircraft, commonly referred to as
- bonding
  - ground \*
  - both a & b
  - none of these
93. Bonding and Grounding connections are made in aircraft electrical systems to
- provide current return paths
  - protect personnel from shock hazards
  - provide stability of radio transmission & reception
  - all of these \*
94. Copper jumpers should be used to bond together parts made of
- stainless steel
  - cadmium plated steel
  - copper, brass or bronze
  - all of these \*



# CHAPTER - 8

## WELDING AND ALLIED PROCESSES

1. Weld splatter defect in welding is generally the result of
  - a. using too high welding current \*
  - b. using too low welding current
  - c. low voltage
  - d. high voltage
  - e. using wrong polarity
2. Poor fusion in a welded joint may be due to
  - a. lack of flux
  - b. improper current \*
  - c. high welding speed
  - d. dirty metal surface
  - e. oxidising atmosphere
3. Which of the following has the poorest weldability ?
  - a. low carbon steel
  - b. mild steel
  - c. wrought iron \*
  - d. high-carbon steel
  - e. alloys steel
4. The parallel fillet welded joints are designed for compressive strength.
  - a. Agree
  - b. Disagree \*
5. In a butt welded joint, the size of weld is ..... the throat of weld.
  - a. 0.5 times
  - b. equal to \*
  - c.  $\sqrt{2}$  times
  - d. double
6. Joggled welded joints are used
  - a. where longitudinal shear is present
  - b. where severe loading is encountered and the upper surface of both pieces must be in the same plane\*
  - c. to join two pieces of metal in the same manner as rivet joint metals
  - d. there is nothing called joggled welded joint
  - e. none of the above
7. In arc welding, eyes need to be protected against
  - a. intense glare
  - b. sparks
  - c. infra-red rays
  - d. ultraviolet rays
  - e. infra-red and ultraviolet rays \*
8. In which type of welding a pool of molten metal is used
  - a. electroslag \*
  - b. submerged arc
  - c. MIG
  - d. TIG
  - e. thermit welding
9. Plain and butt welds may be used on materials upto approximately
  - a. 25 mm thick \*
  - b. 40 mm thick
  - c. 50 mm thick
  - d. 70 mm thick
  - e. 90 mm thick
10. The main criterion for selection of electrode diameter in arc welding is
  - a. material to be welded
  - b. type of welding process
  - c. thickness of material \*
  - d. voltage used
  - e. current used
11. Which of the following is preferred for welding of nonferrous metals by arc welding
  - a. A.C. low frequency
  - b. A.C. high frequency
  - c. D.C. \*
  - d. all of the above
  - e. none of the above
12. In arc welding, arc is created between the electrode and work by
  - a. flow of current
  - b. voltage
  - c. material characteristics
  - d. contact resistance \*
  - e. electrical energy
13. Open circuit voltage for arc welding is of the order of
  - a. 18-40 volts
  - b. 40-95 volts \*
  - c. 100-125 volts
  - d. 130-170 volts
  - e. 190-240 volts
14. The material used for cooling the electrode is called
  - a. protective layer
  - b. binder
  - c. slag
  - d. deoxidiser
  - e. flux \*
15. Plug weld joint is used
  - a. where longitudinal shear is present
  - b. where severe loading is encountered and the upper surfaces of both pieces must be in the same plane
  - c. to join two pieces of metal in the same manner as rivet joint metals \*
  - d. there is nothing like plug weld joint
  - e. none of the above

16. Which of the following welding process uses non-consumable electrode
- LASER welding
  - MIG welding
  - TIG welding \*
  - iron beam welding
  - plasma welding
17. When welding is going on, arc voltage is of the order of
- 18-40 volts \*
  - 40-95 volts
  - 100-125 volts
  - 130-170 volts
  - 190-240 volts
18. Following gases are used in tungsten inert gas welding
- hydrogen and oxygen
  - CO<sub>2</sub> and H<sub>2</sub>
  - argon and neon
  - helium and neon
  - argon and helium \*
19. T-joint weld is used
- where longitudinal shear is present \*
  - where severe loading is encountered and the upper surface of both pieces must be in the same plane
  - to join two pieces of metal in the same manner as rivet joint metals
  - to join two pieces perpendicularly
  - none of the above
20. Pick up the incorrect statement about MIG welding
- no flux required \*
  - high welding speed
  - increased corrosion resistance
  - even unclean surface can be welded to obtain sound welds
  - even materials like aluminium and stainless steel can be welded
21. Copper is
- easily spot welded
  - very difficult to be spot welded \*
  - preferred to be welded by spot welding material
  - preferred to be welded by spot welding
  - none of the above
22. It is not possible to arc weld all types of metals with transformer set because it does not have provision for
- control of current
  - control of voltage
  - control of time duration
  - change of polarity \*
  - all of the above
23. Two sheets of same material but different thickness can be butt welded by
- adjustment of the current
  - time duration of current
  - pressure applied
  - changing the size of one electrode \*
  - all of the above
24. Projection welding is
- multi-spot welding process \*
  - continuous spot welding process
  - used to form mesh
  - used to make cantilevers
  - none of the above
25. Welding process in which two pieces to be jointed are overlapped and placed between two electrodes is known as
- percussion welding
  - projeciton welding
  - seam welding
  - spot welding \*
  - butt welding
26. Half corner weld is used
- where longitudinal shear is present
  - where severe loading is encountered and the upper surfaces of both pieces must be in the same plane
  - to join two pieces of metal in the same manner as rivet joint metals
  - where efficiency of joint should be 50%
  - none of the above \*
27. In resistance welding, voltage used for heating is
- 1 V
  - 10 V \*
  - 100 V
  - 500 V
  - 1000 V
28. Best reason to decide use of welding in preference to riveting for structural work on extension to a hospital could be
- it is cheaper
  - it is convenient
  - it produces rigid structure
  - it is quieter \*
  - it is more flexible and requires less skilled persons
29. In resistance welding, the pressure is realised
- just at the time of passing the current
  - after completion of current
  - after the weld cools \*
  - during heating period
  - the pressure is never applied
30. Grey cast iron is best welded by
- TIG
  - arc
  - MIG
  - submerged arc
  - oxy-acetylene \*
31. Seam welding is
- multi-spot welding process
  - continuous spot welding process \*
  - used to form mesh
  - used for welding cylindrical objects
  - none of the above

32. Upto what thickness of plate, edge preparation for welding is not required  
 a. 4 mm \*                      b. 6 mm  
 c. 8 mm                         d. 10 mm  
 e. 15 mm
33. Preheating is essential in welding  
 a. high speed steel         b. stainless steel  
 c. cast iron \*                d. german silver  
 e. aluminium
34. Grey cast iron is usually welded by  
 a. gas welding \*  
 b. resistance welding  
 c. arc welding  
 d. TIG welding  
 e. MIG welding
35. For welding mild steel, the following arc welding is most suitable  
 a. AC, straight polarity \*  
 b. DC, straight polarity  
 c. AC, reverse polarity  
 d. DC, reverse polarity  
 e. any of the above
36. The brazing metals and alloys commonly used are  
 a. copper                        b. copper alloys  
 c. silver alloys                d. aluminium alloys  
 e. all of the above \*
37. Forge welding is best suited for  
 a. stainless steel  
 b. high carbon steel  
 c. cast iron  
 d. wrought iron \*  
 e. all of the above
38. Two sheets of different materials but same thickness can be spot welded by  
 a. adjusting the current  
 b. adjusting the time duration of current  
 c. adjusting the pressure applied  
 d. changing the size of one electrode \*  
 e. all of the above
39. Laser welding finds widest application in  
 a. heavy industry  
 b. structural work  
 c. process industry  
 d. electronic industry \*  
 e. all of the above
40. Which of the following carbon steels is most weldable  
 a. 0.15% carbon steel \*  
 b. 0.30% carbon steel  
 c. 0.50% carbon steel  
 d. 0.75% carbon steel  
 e. 1.00% carbon steel
41. Pick up the incorrect statement about friction welding  
 a. little preparation required for joints  
 b. dissimilar metals can be welded  
 c. it is best suited for welding of plastics  
 d. any type of configuration can be welded \*  
 e. welds can be produced very rapidly and of sound quality
42. Unlike materials as well as materials of different thickness can be butt welded by  
 a. control of pressure and current \*  
 b. adjusting time duration of current  
 c. adjusting initial gap  
 d. all of the above  
 e. none of the above
43. Cross-wire welding is  
 a. multi-spot welding process  
 b. continuous spot welding process  
 c. used to form mesh \*  
 d. used where additional strength is desired  
 e. none of the above
44. In arc welding, temperature of the following order may be generated  
 a. 1000°C                        b. 1500°C  
 c. 5500°C \*                      d. 8000°C  
 e. 10,000°C
45. Long arc lengths in welding would require the voltages and currents respectively as follows  
 a. high, high                    b. low, low  
 c. high, low \*                    d. low, high  
 e. any combination
46. Fluxes are used in welding in order to protect the molten metal and the surfaces to be jointed from  
 a. oxidation \*  
 b. carburizing  
 c. dirt  
 d. distortion and warping  
 e. unequal temperature distribution
47. Metal deposited on to the workpiece from the electrode  
 a. is forced across the arc \*  
 b. falls because of gravity  
 c. is attracted towards the workpiece due to the positive polarity of the workpiece  
 d. is attracted towards the workpiece due to the negative polarity of the workpiece  
 e. is attracted due to electromagnetic action
48. In arc welding operations the current value is decided by  
 a. thickness of plate  
 b. length of welded portion  
 c. voltage across the arc  
 d. speed of travel  
 e. size of the electrode \*

49. The phenomenon of weld decay occurs in  
 a. cast iron                      b. brass  
 c. bronze                         d. stainless steel \*  
 e. carbon steel
50. Weaving in arc welding refers to  
 a. side to side motion of electrode at right angles to the direction of the welding \*  
 b. side to side motion of electrode along the direction of the welding  
 c. spiral motion given to electrode  
 d. a technique of striking the arc  
 e. arc blow action due to electromagnetic forces
51. Weld spatter is  
 a. flux  
 b. electrode coating  
 c. welding defect \*  
 d. welding test  
 e. welding technique
52. Arc blow occurs in  
 a. gas welding  
 b. gas cutting  
 c. arc welding when straight polarity is used \*  
 d. arc welding when reverse polarity is used  
 e. welding stainless steel
53. Low hydrogen electrodes are baked prior to use in order that  
 a. proper strength is obtained  
 b. welding is free from arc blow  
 c. welding is free from moisture pick up \*  
 d. current required is minimum  
 e. electrode does not crumble during use
54. Gray iron is usually welded by  
 a. gas welding \*  
 b. arc welding  
 c. resistance welding  
 d. TIG welding  
 e. MIG welding
55. Stud and projection welding belong to the following category of welding  
 a. gas welding  
 b. arc welding  
 c. resistance welding \*  
 d. pressure welding  
 e. thermit welding
56. In straight polarity welding  
 a. electrode holder is connected to the negative and work to positive \*  
 b. electrode holder is connected to the positive and work to negative  
 c. work is positive and holder is earthed  
 d. holder is positive and work is earthed  
 e. work is negative and holder is earthed
57. In arc welding process the intense heat is developed between the work and the electrode largely due to  
 a. current  
 b. voltage  
 c. electrical energy  
 d. contact resistance \*  
 e. time of current flow
58. In thermit welding, the iron oxide and aluminium oxide are mixed in the proportion of  
 a. 1 : 1  
 b. 3 : 1 \*  
 c. 1 : 3  
 d. mixture is of different oxides  
 e. none of the above
59. TIG welding is best suited for welding  
 a. mild steel                      b. stainless steel  
 c. carbon steel                  d. silver  
 e. aluminium \*
60. In the manual TIG welding, the angle of the electrode holder with the direction of welding is  
 a. 30°                                b. 45°  
 c. 60°                                d. 70° \*  
 e. 90°
61. Arc stability is better with  
 a. AC welding \*  
 b. DC welding  
 c. both AC and DC welding  
 d. specially designed wave forms  
 e. rectified supply
62. The following welding process uses consumable electrode  
 a. TIG                                b. MIG \*  
 c. thermit                          d. laser  
 e. gas
63. Electrode gets consumed in the following welding process  
 a. gas                                 b. resistance  
 c. thermit                          d. arc \*  
 e. TIG
64. Two stainless steel foils of 0.1 mm thickness are to be joined. Which of the following processes would be best suited  
 a. gas welding                    b. electroslag welding  
 c. TIG welding                    d. MIG welding  
 e. plasma arc welding \*
65. Magnetic arc blow is  
 a. a recent welding technique  
 b. used to weld hard materials  
 c. occurs when welding near equator  
 d. of importance during striking of arc  
 e. phenomenon of occurrence of splatter because of magnetic fields created in d.c. arc welding \*



66. Arc length in arc welding should be equal to  
 a. half the diameter of electrode rod  
 b. rod diameter \*  
 c. twice the rod diameter  
 d. 2.5 times the rod diameter  
 e. none of the above
67. The amperage to be used in arc welding is dependent upon  
 a. work thickness  
 b. arc gap  
 c. electrode and thickness \*  
 d. other considerations  
 e. none of the above
68. In coated electrode in arc welding  
 a. both rod and coating melt simultaneously  
 b. coating melts first and then rod melts  
 c. which melts first depends on polarity used  
 d. rod melts first and then coating melts \*  
 e. there is no such criterion
69. Two M.S. plates, 20 cm thick for boiler drum are to be butt welded. Which of the following process would be best suited  
 a. submerged arc welding  
 b. plasma arc welding  
 c. plasma arc welding  
 d. TIG/MIG welding  
 e. electroslag welding \*
70. Pick up the incorrect statement  
 A.C. arc welding always employs coated electrodes, because it  
 a. has high efficiency and low splatter  
 b. uses less input current  
 c. is safest for operator \*  
 d. has low leakage loss  
 e. protects the newly formed weld against atmosphere
71. In reverse polarity welding  
 a. electrode holder is connected to the negative and work to positive  
 b. electrode holder is connected to the positive and work to negative \*  
 c. work is positive and holder is earthed  
 d. holder is positive and work is earthed  
 e. work is negative and holder is earthed
72. Pick up the incorrect statement  
 Coatings on electrodes are used to produce gas shields to protect the weld from atmosphere. The coating consists of  
 a. flux and slagging materials like titanium oxide and calcium fluoride  
 b. stabilisers to prevent splattering  
 c. titanium oxide or potassium compounds to increase the melting rate, and ferro-manganese as a deoxidiser  
 d. molasses as binder \*
73. The temperature of the plasma torch is of the order of  
 a. 1000°C  
 b. 5000°C  
 c. 10,000°C  
 d. 33,000°C \*  
 e. 75,000°C
74. Following equipment is used for arc welding a material by carbon electrode  
 a. a.c. welding set  
 b. rectifier  
 c. motor generator  
 d. d.c. welding set with straight polarity \*  
 e. d.c. welding set with reverse polarity
75. The strength of a properly welded joint as compared to base metal would be  
 a. same  
 b. more \*  
 c. less  
 d. unpredictable  
 e. two can't be compared
76. The advantages of electroslag welding arc  
 a. ability to weld metals of great thickness in a single pass without calling for joint preparation  
 b. high welding speed  
 c. little distortion and good stress distribution across the weld  
 d. protection from contamination  
 e. all of the above \*
77. In arc welding, if arc is too short, it will result in  
 a. formation of large globules in an irregular pattern because of wandering of arc, leading to poor fusion with base metal  
 b. electrode sticking to the base metal and base metal not melting and bead resisting on top of the work\*, leading to poor fusion and gas and slag holes  
 c. arc extinction  
 d. operator hazard  
 e. no welding
78. Too low welding current in arc welding would result in  
 a. excessive piling up of weld metal, poor penetration, wasted electrodes \*  
 b. excessive spatter, under cutting along edges, irregular deposits, wasted electrodes  
 c. too small bead, weak weld and wasted electrodes  
 d. excessive piling up of weld metal, overlapping without penetration of edges, wasted electrodes  
 e. none of the above
79. Of the following brazing joints, which is strongest  
 a. butt  
 b. scarf (inclined)  
 c. lap \*  
 d. all are equally strong  
 e. strength depends on other factors

80. In braze welding, the filler metal is
- distributed by capillary attraction
  - melted and deposited at the point where the weld is to be made \*
  - both of the above
  - not required
  - none of the above
81. The melting point of the filler metal in brazing should be above
- 420°C \*
  - 600°C
  - 800°C
  - 900°C
  - 1000°C
82. Too high welding current in arc welding would result in
- excessive piling up of weld metal, poor penetration, wasted electrodes
  - excessive spatter, under cutting along edges, irregular deposits, wasted electrodes \*
  - too small bead, weak weld and wasted electrodes
  - excessive piling up of weld metal, overlapping without penetration of edges, wasted electrodes
  - none of the above
83. Arc length in arc welding should be nearly equal to
- diameter of electrode rod (d) \*
  - 1.5d
  - 2d
  - 3d
  - 4d
84. In arc welding if arc is too long, it will result in
- formation of large globules in an irregular pattern because of wandering of arc, leading to poor fusion with base metal \*
  - electrode sticking to the base metal and base metal not melting and bead resting on top of the work, leading to poor fusion and gas and slag holes
  - arc extinction
  - operator hazard
  - no welding
85. The carburizing flame as compared to oxidising flame is
- more luminous \*
  - less luminous
  - equally luminous
  - unpredictable
  - none of the above
86. The temperature of the inner luminous cone of neutral flame is the order of
- 1000°C
  - 2000°C
  - 2500°C
  - 3500°C \*
  - 5900°C
87. The most commonly used flame in gas welding is
- neutral \*
  - oxidising
  - carburizing
  - all of the above
  - none of the above
88. The maximum flame temperature occurs at
- the tip of flame
  - the inner cone \*
  - next to the inner cone
  - at the outer cone
  - just inside the inner cone
89. Submerged arc welding is
- a process which uses a mixture of iron oxide and granular aluminium
  - accomplished by maintaining a hot molten metal pool between plates
  - a process in which arc is maintained under a blanket of flux \*
  - all of the above
  - none of the above
90. The vacuum of following order is maintained in the electron beam welding machine
- 1 torr
  - $10^{-2}$  torr
  - $10^{-3}$  torr
  - $10^{-5}$  torr \*
  - $10^{-8}$  torr
91. Too fast welding speed in arc welding would result in
- excessive piling up of weld metal, poor penetration, wasted electrodes
  - excessive spatter, under cutting along edges, irregular deposits, wasted electrodes
  - too small head, weak weld and wasted electrodes \*
  - excessive piling up of weld metal, overlapping without penetration of edges, wasted electrodes
  - none of the above
92. The temperature produced in oxyhydrogen flame as compared to oxy-acetylene flame is
- same
  - more
  - less \*
  - unpredictable
  - none of the above
93. The amount of current necessary in resistance welding is of the order of
- 1 - 2 kVA/cm<sup>2</sup>
  - 2.5 - 4.0 kVA/cm<sup>2</sup>
  - 4.5 - 6.2 kVA/cm<sup>2</sup> \*
  - 6.5 - 7.9 kVA/cm<sup>2</sup>
  - none of the above
94. The quantum of heat generated in resistance welding depends upon
- welding current alone
  - resistance of current conducting path alone
  - time for current current flow alone
  - area of welding electrode alone
  - none of the above \*

95. The electroslag welding is
- a process which uses a mixture of iron oxide and granular aluminium
  - accomplished by maintaining a hot molten metal pool between plates \*
  - a process in which arc is maintained under a blanket of flux
  - there is nothing called electroslag
  - none of the above
96. In MIG welding, the metal is transferred in the form of
- a fine spray of metal \*
  - molten drops
  - weld pool
  - molecules
  - very fine metal
97. Too slow welding speeds in arc welding would result in
- excessive piling up of weld metal, poor penetration, wasted electrodes
  - excessive spatter, under cutting along edges, irregular deposits, wasted electrodes
  - too small bead, weak weld and wasted electrodes
  - excessive piling up of weld metal, overlapping without penetration of edges, wasted electrodes \*
  - none of the above
98. Carbon arc welding is
- a process which uses a mixture of iron oxide and granular aluminium
  - accomplished by maintaining a hot molten metal pool between plates
  - a process in which arc is maintained under a blanket of flux
  - used to weld carbon rods
  - none of the above \*
99. In which welding process the parts are heated to welding temperature and then mechanical force is applied at the ends to unite the metals
- TIG
  - thermit
  - atomic hydrogen
  - plasma
  - forge \*
100. Thermit welding is
- a process which uses a mixture of iron oxide and granular aluminium \*
  - accomplished by maintaining a hot molten metal pool between plates
  - a process in which arc is maintained under a blanket of flux
  - in no welding process
  - none of the above
101. Iron oxide and aluminium are mixed in following proportion in thermit welding
- 1 : 1
  - 1 : 3
  - 3 : 1 \*
  - 1 : 2
  - 2 : 1
102. Arc welding uses following electric supply
- A.C.
  - D.C.
  - both AC and DC \*
  - spiral waveform
  - none of the above
103. It is required to permanently connect the end of a structural steel angle to a vertical plate. The following type would be preferable
- tack weld
  - fillet weld \*
  - butt weld
  - plug weld
  - lap weld
104. The welding of stainless is generally difficult because of the following reason
- rust formation takes place
  - high melting temperature of stainless steel
  - formation of oxide film \*
  - formation of chromium carbide
  - fear of cracking
105. Filler material in welding should have
- same composition as the parent metal to be welded
  - same melting temperature as the parent metal to be welded
  - same composition and same melting temperature as the parent metal to be welded \*
  - same composition as of electrode
  - melting temperature much lower than the melting temperature of the parent metal
106. Distortion in welding occurs due to
- use of excessive current
  - improper clamping methods \*
  - use of wrong electrodes
  - oxidation of weld pool
  - improper composition of parent material
107. In inert gas arc welding following is used for welding magnesium
- non-combustible electrode in combination with helium and d.c. current \*
  - combustible electrodes and argon in combination with a.c. current
  - straight polarity d.c. current
  - carbon dioxide, because of its excellent penetration and high speed
  - none of the above

108. Oxygen to acetylene ratio in case of neutral flame is  
 a. 0.8 : 1.0                      b. 1 : 1 \*  
 c. 1.2 : 1                         d. 2 : 1  
 e. none of the above
109. In inert gas arc welding, following is used for welding aluminium  
 a. noncombustible electrode in combination with helium and d.c. current  
 b. combustible electrode and argon in combination with a.c. current \*  
 c. straight polarity d.c. current  
 d. carbon dioxide, because of its excellent penetration and high speed  
 e. none of the above
110. In metallic arc welding, the transfer of metal from the electrode is due to  
 a. molecular attraction  
 b. surface tension and attraction  
 c. gravitational force  
 d. ionisation of the space between the electrode and work piece  
 e. both 'a' and 'b' are correct \*
111. In which of the following welding techniques, the weld pool is surrounded by an inert gas  
 a. arc welding  
 b. carbon arc  
 c. MIG \*  
 d. submerged arc  
 e. electroslag welding
112. The striking voltage as compared to voltage during welding in arc welding is  
 a. same  
 b. more \*  
 c. less  
 d. unpredictable  
 e. none of the above
113. In inert gas arc welding, following is used for welding carbon steel  
 a. noncombustible electrode in combination with helium and d.c. current  
 b. combustible electrodes and argon in combination with a.c. current  
 c. straight polarity d.c. current  
 d. carbon dioxide, because of its excellent penetration and high speed \*  
 e. none of the above
114. Filter metal is used in  
 a. electric spot welding  
 b. seam welding  
 c. projection welding  
 d. continuous welding  
 e. none of the above \*
115. The arc length in electric arc welding is the distance between the tip of the electrode and the  
 a. work piece  
 b. centre of crater \*  
 c. bottom of crater  
 d. workpiece top surface minus electrode diameter  
 e. none of the above
116. Thermit welding is a form of  
 a. resistance welding  
 b. gas welding  
 c. fusion welding \*  
 d. forge welding  
 e. arc welding
117. Which of the following metals can be suitably welded by TIG welding  
 a. aluminium  
 b. stainless steel  
 c. magnesium  
 d. pure titanium  
 e. all of the above \*
118. In MIG welding, helium or argon is used in order to  
 a. provide cooling effect  
 b. act as flux  
 c. act as shielding medium \*  
 d. facilitate welding process  
 e. protect electrode
119. Weld spatter refers to  
 a. welding electrode  
 b. flux  
 c. filler material  
 d. welding defect \*  
 e. shield
120. Flash butt welding belongs to the following category of welding  
 a. gas welding  
 b. arc welding with straight polarity  
 c. arc welding with reverse polarity  
 d. resistance welding \*  
 e. thermit welding
121. Seam welding is  
 a. arc welding  
 b. multi spot welding  
 c. continuous spot welding \*  
 d. used for forming sound bars  
 e. gas welding
122. In resistance welding the electrode material is made of  
 a. carbon steel  
 b. stainless steel  
 c. copper \*  
 d. high speed steel  
 e. graphite

123. If 't' is the thickness of sheet to be spot welded, then electrode tip diameter is equal to  
 a.  $\sqrt{t}$  \*  
 b. t  
 c.  $1.5\sqrt{t}$   
 d.  $2\sqrt{t}$   
 e.  $2.5\sqrt{t}$
124. Submerged arc welding uses following type of electrode  
 a. bare rods \*  
 b. coated electrodes  
 c. core wires  
 d. copper electrodes  
 e. stainless steel rods
125. The flux in submerged arc welding is in the form of  
 a. coating on the electrodes  
 b. core wires  
 c. granules \*  
 d. an inert gas  
 e. paste
126. The arc in atomic hydrogen welding takes place between the  
 a. parent metals  
 b. consumable tungsten electrode and workpiece  
 c. non-consumable tungsten electrode and workpiece  
 d. consumable tungsten electrode and filler rod  
 e. two tungsten electrodes \*
127. The arc in argon arc welding takes place between the  
 a. parent metals  
 b. consumable tungsten electrode and workpiece  
 c. non-consumable tungsten electrode and filler rod  
 d. non-consumable tungsten electrode and workpiece\*  
 e. consumable tungsten electrode and filler rod
128. The following gas is used in tungsten-inert-gas welding process  
 a. acetylene                      b. oxygen  
 c. hydrogen                      d. argon \*  
 e. helium
129. The main advantage of MIG welding over TIG welding is that  
 a. former can be used to weld hard to weld metal  
 b. former permits use of large currents thereby allowing higher deposition \*  
 c. welding rate is very fast  
 d. welding is completely automatic  
 e. all of the above
130. Which of the following materials is best weldable with itself  
 a. stainless steel                  b. copper  
 c. aluminium                      d. mild steel \*  
 e. cast iron
131. Which of the following materials is best cut by oxy-cutting process  
 a. brass                              b. copper  
 c. bronze                            d. stainless steel  
 e. mild steel \*
132. Oxy-acetylene flame cuts metal by its  
 a. evaporation                    b. oxidation  
 c. burning                          d. rusting  
 e. intensive oxidation \*
133. In gas welding the combustion takes place by mixing oxygen with  
 a. hydrogen  
 b. fuel gas \*  
 c. CO  
 d. CO<sub>2</sub>  
 e. mixture of several gases
134. In inert gas arc welding, following is used for welding stainless steel, copper or cast iron  
 a. noncombustible electrode in combination with helium and d.c. current  
 b. combustible electrode and argon in combination with a.c. current  
 c. straight polarity d.c. current \*  
 d. carbon dioxide, because of its excellent penetration and high speed  
 e. none of the above
135. Oxygen to acetylene ratio in case of carburizing flame is  
 a. 0.5 : 1                            b. 0.9 : 1 \*  
 c. 1 : 1                                d. 1 : 1.2  
 e. 2 : 1
136. Carburizing flame is used to weld metals like  
 a. steel  
 b. copper and brass  
 c. aluminium, stainless steel, zinc die castings, nickle, monel etc \*  
 d. carburised steel  
 e. none of the above
137. Neutral flame has  
 a. 1 zone                            b. 2 zones \*  
 c. 3 zones                          d. 4 zones  
 e. no zone
138. Carburizing flame has  
 a. 1 zone                            b. 2 zones  
 c. 3 zones \*                        d. 4 zones  
 e. no zone
139. In forehand gas welded operation, the angle between the rod and work is kept around  
 a. 30° \*                                b. 45°  
 c. 60°                                 d. 75°  
 e. 90°

140. For welding metals less than 5 mm thick following method of gas welding would give best results
- forehand \*
  - backhand
  - straight hand
  - inclined hand
  - any one of the above
141. In the following welding technique, the flame of the torch is directed against the completed weld
- overhead welding
  - horizontal welding
  - forehand welding
  - backhand welding \*
  - is never done
142. The acetylene cylinder is filled with a material saturated with
- calcium carbide
  - calcium oxide
  - black carbon
  - acetone \*
  - acetylene
143. Oxygen to acetylene ratio in case of oxidising flame is
- 1 : 1
  - 1.2 : 1
  - 1.5 : 1 \*
  - 2 : 1
  - 3 : 1
144. Neutral flame is used to weld metals like
- steel \*
  - copper and brass
  - aluminium, stainless steel, zinc die castings, nickle, monel etc.
  - neutral materials
  - none of the above
145. Acetylene is stored in the gas cylinders
- in gaseous form
  - in liquid form \*
  - in solid form
  - under high pressure
  - under low pressure
146. Cylinders in which oxygen gas is stored are
- fabricated by casting
  - fabricated by welding
  - fabricated by forging
  - properly heat treated
  - seamless steel cylinders \*
147. Acetylene gas is generated from
- carbon
  - calcium
  - calcium carbonate
  - calcium chloride
  - calcium carbide \*
148. The following flux is used for brazing brass, copper, bronze and low carbon steels
- miximum of boric acid, borax and a wetting agent \*
  - boric acid, borax or fluoride with a wetting agent
  - chlorides and fluorides mixed with water
  - all of the above
  - none of the above
149. Oxidising flame is used to weld materials like
- steel
  - copper and brass \*
  - aluminium, stainless steel, zinc die castings, nickle, monel etc.
  - abrasives
  - none of the above
150. The gas torch is usually lighted by a friction lighter because
- it is easier to operate and maintain
  - of low initial cost
  - spark is created for very short duration
  - of safety of operator \*
  - of least running cost
151. Metals like copper and brass can be welded by
- oxidising flame \*
  - carburizing flame
  - neutral flame
  - any one of the above flames
  - can't be welded by gas welding
152. Positive pressure type torch works on
- equal pressure principle \*
  - positive pressure principle
  - differential pressure principle
  - equal volume principle
  - equal flow principle
153. In forehand gas welding operation, the angle between the torch and work is kept around
- 30°
  - 45° \*
  - 60°
  - 75°
  - 90°
154. For welding overhead joints in horizontal plane, following technique of gas welding is used
- forehand
  - back hand \*
  - straight hand
  - inclined hand
  - any one of the above
155. The surface cracks in the weldment of nonmagnetic alloys can be inspected by
- X-ray test
  - ultrasonic testing
  - flurorescent test \*
  - magnaflux method
  - any one of the above
156. The surface and sub-surface cracks in nonmagnetic alloys can be inspected by
- X-ray testing
  - ultrasonic testing
  - magnetic particle inspection testing
  - dye penetrant testing \*
  - any one of the above

157. Undercuts in weldments are caused due to  
 a. low welding current  
 b. excessive welding current \*  
 c. wrong selection of welding current  
 d. wrong flux  
 e. greasy and dirty surfaces
158. For two metals to be brazed properly, i.e. for wetting action to take place, the distance between two surfaces should be  
 a. less than 0.025 mm  
 b. between 0.025 mm and 0.075 mm \*  
 c. more than 0.1 mm  
 d. about 0.5 mm  
 e. none of the above
159. The following flux is used for brazing cast iron  
 a. mixture of boric acid, borax and wetting agent  
 b. boric acid, borax or fluoride with a wetting agent \*  
 c. chlorides and fluorides mixed with water  
 d. all of the above  
 e. none of the above
160. Which is not correct statement about the function of flux in brazing  
 a. to avoid thermal distortion and cracking \*  
 b. to dissolve surface oxide coatings which have formed prior to brazing  
 c. to prevent oxides from forming during the brazing operation on both the base metal and the brazing material  
 d. to facilitate the wetting process by reducing the viscosity of the melt  
 e. to give the filler metal the fluidity to wet the joint surfaces completely
161. Solder is essentially a  
 a. tin-silver base  
 b. tin lead base \*  
 c. tin-bismuth base  
 d. silver lead base  
 e. bismuth lead base
162. A soldering iron 'bit' is made of  
 a. brass  
 b. tin  
 c. steel  
 d. copper \*  
 e. iron
163. Binding wire used to support the joints for soldering is made of  
 a. aluminium  
 b. copper  
 c. soft iron \*  
 d. mild steel  
 e. tin
164. The quality expected from flux used in silver soldering is that it should be able to  
 a. dissolve oxides formed on the work \*  
 b. fill up any gap in the joint  
 c. vitrify after the solder has become molten  
 d. form an oxide during the soldering operation  
 e. cover up and protect oxides formed on the work
165. Which of the following has the lowest melting point?  
 a. brazing spelter  
 b. copper  
 c. soft solder \*  
 d. silver solder  
 e. aluminium
166. The purpose of using flux in soldering is to  
 a. increase fluidity of solder metal  
 b. fill up gaps left on a bad joint  
 c. prevent oxides forming \*  
 d. lower the melting temperature of the solder  
 e. wash away surplus solder
167. The flux in brazing process is used in the form of  
 a. powder  
 b. liquid  
 c. paste  
 d. any one of the above \*  
 e. none of the above
168. Soldering iron is made of wedge shape in order to  
 a. apply high pressure at edge  
 b. retain heat \*  
 c. retain solder  
 d. facilitate molecular attraction  
 e. none of the above
169. Brazing is the process of  
 a. joining plastic sheets  
 b. hard soldering using brass spelter \*  
 c. casting in brass  
 d. making steel look like brass  
 e. joining protruded sections by melting
170. Spelter is same as  
 a. tin  
 b. zinc \*  
 c. lead  
 d. silver  
 e. brass
171. A brazed joint may be satisfactorily used on components made of  
 a. tinplate  
 b. brass  
 c. copper \*  
 d. aluminium  
 e. all of the above
172. When brazing is carried out  
 a. a joint is made between two parts by molten spelter\*  
 b. the edges of the joint melt and run together  
 c. spelter forms an alloy with the flux  
 d. flux prevents the work from melting  
 e. flux acts as a cementing material
173. Entrapped fluxes, during brazing result in  
 a. presence of gas pockets  
 b. corrosion \*  
 c. cracking  
 d. distortion of joints  
 e. erosion

174. Which is incorrect statement about corrosive flux in soldering process
- corrosive flux may be made by mixing three parts of zinc chloride and one part of sal ammoniac with water
  - corrosive flux is rusted one and useless for soldering \*
  - the term corrosive flux refers to the reaction which takes place after the soldering operation is consummated
  - corrosive flux is used to solder non-ferrous material like copper, brass aluminium or nickel
  - corrosive flux is used to solder carbon steel also
175. Heat for soldering process supplied by
- soldering iron
  - induction furnace
  - electric resistance method
  - any one of these \*
  - none of the above
176. The temperature range for soldering process is
- 40°C to 100°C
  - 180° to 250°C \*
  - 300°C to 500°C
  - 600°C to 900°C
  - around 1000°C
177. Zinc chloride is used in the following process
- tempering
  - annealing
  - brazing
  - hardening
  - soft soldering \*
178. An important precaution to produce a good soldering joint is that
- the soldering iron bit must first be made red hot
  - the joint area must be clean and close-fitting \*
  - aluminium wire must be placed along the joint
  - a thin film of lubricating oil must be applied to the joint gases
  - flux should be applied both before and after soldering
179. The following flux is used for brazing aluminium and magnesium
- mixture of boric acid, borax and wetting agent
  - boric acid, borax or fluoride with a wetting agent
  - chlorides and fluorides mixed with water \*
  - any one of the above
  - none of the above
180. Post cleaning is necessary at brazed joint in order to avoid
- scaling
  - slagging
  - oxidation
  - corrosion \*
  - weak joint
181. The purpose of using borax is to
- replace flux
  - dissolve oxides when heating the work \*
  - accelerate the formation of oxides on the work
  - prevent the spelter from melting too quickly
  - increase fluidity of braze material
182. The commonly used flux for brazing is
- resin
  - $\text{NH}_4\text{Cl}$
  - borax \*
  - soft iron
  - soft silver
183. The brazing process is carried in the temperature range of
- 150°C to 250°C
  - 250°C to 450°C
  - 500°C to 700°C
  - 700°C to 900°C \*
  - at around 1000°C
184. In electric resistance welding, pressure is applied just after the completion of current.
- True \*
  - False
185. The current in electric resistance welding can be regulated by
- varying the input supply
  - changing the primary turns of the transformer \*
  - changing the secondary turns of the transformer
  - any one of the above
186. Spot welding is used for welding
- lap joints in plates having 0.025 mm to 1.25 mm thickness \*
  - lap joints in plates having thickness above 3 mm
  - butt joints in plates having 0.025 mm to 1.25 mm thickness
  - butt joints in plates having thickness above 3 mm
187. The electrodes used in spot welding have a tip of
- stainless steel
  - aluminium
  - copper \*
  - brass
188. Seam welding is a
- continuous spot welding process \*
  - multi-spot welding process
  - arc welding process
  - process used for joining round bars
189. Projection welding is a
- continuous spot welding process
  - multi-spot welding process \*
  - arc welding process
  - process used for joining round bars
190. When two pieces of different metals are to be welded by projection welding, then the projection should be made on the metal piece having ..... conductivity.
- lower
  - higher \*
191. When two metal pieces of different thickness are to be welded by projection welding, then the projections should be made on ..... metal piece
- thinner
  - thicker \*
192. The welding process used to join the ends of two pipes of uniform cross-section, is
- spot welding
  - seam welding
  - projection welding
  - upset butt welding\*





213. For gas welding, the pressure desired at the welding torch for oxygen is  
 a. 7 to 103 kN/m<sup>2</sup> \*      b. 70 to 280 kN/m<sup>2</sup> \*  
 c. 280 to 560 kN/m<sup>2</sup>      d. 560 to 840 kN/m<sup>2</sup>
214. For gas welding, the pressure desired at the welding torch for acetylene is  
 a. 7 to 103 kN/m<sup>2</sup> \*      b. 70 to 280 kN/m<sup>2</sup>  
 c. 280 to 560 kN/m<sup>2</sup>      d. 560 to 840 kN/m<sup>2</sup>
215. Acetylene gas is stored in cylinders in  
 a. Solid form      b. Gaseous form  
 c. Liquid form \*      d. any one of these
216. The low pressure acetylene is produced at the welding site by the chemical reaction between water and calcium carbonate  
 a. Right      b. Wrong \*
217. Most of the oxy-acetylene welding is done with  
 a. neutral flame \*      b. oxidising flame  
 c. carburising flame      d. all of these
218. The maximum flame temperature occurs  
 a. at the outer cone  
 b. at the inner cone \*  
 c. between the outer and inner cone  
 d. at the torch tip
219. The temperature of the inner luminous cone of neutral flame is about  
 a. 1000<sup>o</sup>C      b. 1250<sup>o</sup>C  
 c. 2100<sup>o</sup>C      d. 3200<sup>o</sup>C \*
220. The oxidising flame is similar to neutral flame but the inner cone is less luminous and shorter  
 a. Yes \*      b. No
221. The temperature produced by oxy-hydrogen flame is about  
 a. 1800<sup>o</sup>C      b. 2100<sup>o</sup>C  
 c. 2400<sup>o</sup>C \*      d. 3200<sup>o</sup>C
222. The temperature of oxy-hydrogen flame is ..... oxy-acetylene flame.  
 a. same as      b. less than \*  
 c. more than
223. A neutral flame is obtained by supplying  
 a. equal volumes of oxygen and acetylene \*  
 b. more volume of oxygen and less volume of acetylene  
 c. more volume of acetylene and less volume of oxygen  
 d. none of the above
224. When more volume of acetylene and less volume of oxygen is supplied, then a ..... flame is obtained  
 a. neutral      b. oxidising  
 c. carburising \*      d. all of these
225. An oxidising flame is obtained when equal volumes of oxygen and acetylene are supplied.  
 a. True      b. False \*
226. Neutral flame is used to weld  
 a. steel      b. cast iron  
 c. copper      d. all of these \*
227. The brass and bronze are welded by ..... flame  
 a. neutral      b. oxidising \*  
 c. carburising      d. all of these
228. Carburising flame is used to weld  
 a. steel, cast iron, copper, aluminium etc.  
 b. brass and bronze  
 c. hard surfacing materials such as satellite \*  
 d. all of these
229. In a gas welding of mild steel using an oxy-acetylene flame, the total amount of acetylene consumed is 10 litre. The oxygen consumption from the cylinder is  
 a. 5 litre      b. 10 litre \*  
 c. 15 litre      d. 20 litre
230. If neutral flame is used in oxy-acetylene welding, both oxygen and acetylene cylinders of the same capacity will be emptied at the same time  
 a. Correct \*  
 b. Incorrect
231. In fore-hand welding, the weld is made  
 a. from left to right  
 b. from right to left \*  
 c. first from left to right and then from right to left  
 d. either from left to right or from right to left
232. When the weld is made from left to right, it is known as back-hand welding.  
 a. Agree \*      b. Disagree
233. In ..... welding, the weld may be made either from left to right or from right to left  
 a. fore-hand      b. back-hand  
 c. vertical \*
234. The oxygen cylinder is usually painted with  
 a. black colour \*      b. white colour  
 c. maroon colour      d. yellow colour
235. The acetylene cylinder is usually painted with  
 a. black colour  
 b. white colour  
 c. maroon colour \*  
 d. yellow colour
236. In fore-hand welding, the angle between the welding rod and the work is kept as  
 a. 30<sup>o</sup> - 40<sup>o</sup> \*      b. 40<sup>o</sup> - 50<sup>o</sup>  
 c. 50<sup>o</sup> - 60<sup>o</sup>      d. 60<sup>o</sup> - 70<sup>o</sup>



258. In manufacturing ERW tube the type of welding generally used is
- Arc welding
  - Electrical resistance welding \*
  - Gas welding
  - Induction welding
  - Thermit welding.
259. Two 3 mm thick MS sheets are to be welded. Electrodes of 16, 12, 10, Nos. are available which one would you choose.
- 16
  - 12
  - 10 \*
  - Any of the above
  - None of the above.
260. Plain and butt welds may be used on materials upto approximately
- 25 mm thick \*
  - 40 mm thick
  - 50 mm thick
  - 75 mm thick
  - 100 mm thick.
261. Which one of the following methods is generally not used in welding of chromium molybdenum steels
- Oxyacetylene
  - Submerged arc
  - Thermit
  - Resistance.\*
262. Weld spatter defect in welding is generally the result of
- Using too high welding current \*
  - Using too low welding current
  - Low voltage
  - High voltage
  - None of the above.
263. Poor fusion in a welded joint may be due to
- Lack of flux
  - Improper current \*
  - High welding speed
  - Dirty metal surface
  - None of the above.
264. In gas welding, the welding rods of 30 mm diameter are available. What will be the maximum thickness of material that can be welded with this rod ?
- 3 mm \*
  - 6 mm
  - 12 mm
  - 25 mm
  - 30 mm.
265. Two 20 mm thick plates are to be gas welded. What size of welding rod should be selected out of the following rods available ?
- 1.5 mm
  - 3 mm
  - 4.5 mm
  - 6 mm \*
  - 8 mm.
266. In arc welding as the thickness of the material to be welded increases, the welding current requirement
- Increases \*
  - Decreases
  - Does not change.
267. Two 12 mm plates are to arc welded with the help of a 8 gauge electrode. What will be the current requirement
- 75 amps
  - 100 amps
  - 125 amps
  - 150 amps \*
  - 130 amps.
268. Porosity of a welded joint may be caused by
- Poor base metal \*
  - Low welding current
  - High welding current
  - Wrong size of electrode
  - None of the above.
269. Principal materials used in soldering are
- Tin and lead \*
  - Copper and tin
  - Zinc and copper
  - Copper and lead
  - None of the above.
270. The method of joining metals by means of cast iron alloy whose melting point is below  $425^{\circ}C$  is known as
- Non-ferrous welding
  - Galvanizing
  - Adhesive bonding
  - Soldering \*
  - Brazing.
271. Grey iron is usually welded by
- Arc welding
  - Gas welding \*
  - TIG welding
  - MIG welding
  - Resistance welding.
272. In thermit welding, heat is generated by
- Combustion of gases
  - Electric arc
  - Reaction of oxygen with metal
  - Chemical reaction involving finely divided aluminium and iron oxide \*
  - None of the above.
273. In ultrasonic welding the frequency range is generally
- 100 - 4000 cps
  - 4000 - 20,000 cps \*
  - 20,000 - 80,000 cps
  - 80,000 - 800,000 cps
  - 800,000 - 5,000,000 cps.
274. Oxygen cylinders are
- Cast iron cylinders
  - Steel cylinders, welded structure
  - Die Cast
  - Seamless steel cylinders \*
  - Alloy steel cylinders, thermit welded.
275. The chemical used in generating acetylene is
- Carbon
  - Charcoal
  - Crushed bone \*
  - Calcium carbonate
  - Calcium carbide.
276. Weld spatter is
- A flux
  - A filler material used in gas welding
  - A filler material used in soldering
  - An electrode used in inert atmosphere
  - A welding defect.\*

277. Which of the following welding process uses consumable electrodes
- MIG welding \*
  - TIG wilding
  - Laser welding
  - Thermit welding
  - Gas welding.
278. Arc blow is a welding defect which is encountered
- In arc welding using a.c. current
  - In arc welding using d.c. current \*
  - In gas welding
  - In thermit welding
  - In MIG welding.
279. During soldering operation, the main function of solder iron is to
- Heat the metals to be jointed
  - Heat the solder \*
  - Heat the flux
  - Remove impurities
  - All of the above.
280. The welding processes are
- Gas welding
  - Arc welding
  - Electric resistance welding.
- The process used for mass production of furniture pipes is
- I only
  - II only
  - III only \*
  - I and II
  - I, II and III.
281. The rating of solder iron normally used for electronics work is
- 50 to 100 watts \*
  - 250 to 500 watts
  - 500 to 750 watts
  - 750 to 1000 watts
  - 1 kW to 2 kW.
282. The range of temperature for soldering process is
- 10°C to 50°C
  - 50°C to 100°C
  - 180°C to 250°C \*
  - 250°C to 400°C
  - 400°C to 650°C.
283. Zinc chloride finds application in
- TIG welding
  - Thermit welding
  - Soft soldering \*
  - Brazing
  - Post weld cleaning.
284. During soldering
- Arc is produced between solder iron and metal to be soldered
  - Solder iron bit is red hot
  - Joint area must be clean and close fitting \*
  - Borax is used a flux
  - Metal is heated from top as well as bottom.
285. During electron beam welding the vacuum is of the order of
- $10^{-5}$  torr \*
  - $10^{-4}$  torr
  - $10^{-3}$  torr
  - $10^{-2}$  torr
  - 1 torr.
286. During oxyacetylene flame cutting, the metal is cut due to
- Molecular transfer
  - Evaporation of metal
  - Burning of metal
  - Intensive oxidation \*
  - Reduction process.
287. The bit of solder iron is generally made of
- Cast iron
  - Mild steel
  - Stainless steel
  - High speed steel
  - Copper \*.
288. Which of the following process is preferred for the welding of grey cast iron ?
- TIG
  - MIG
  - Submerged arc
  - Oxy-acetylene \*
  - Thermit.
289. Preheating is usually done while welding
- Thin sheets of mild steel
  - Thick sheets of mild steel
  - Cast iron \*
  - Copper
  - Aluminium.
290. Which of the following process will be preferred for joining thin foils ?
- Gas welding
  - MIG welding
  - Plasma arc welding
  - DC arc welding \*
  - Thermit welding.
291. During arc welding if the current is too low, it is likely to result in
- Poor penetration
  - Excess piling up of weld metal
  - Excessive electrode consumption
  - All of the above \*
  - None of the above.
292. Plug welded joints are used
- To join two pieces of metal in the same manner as riveted joint metals \*
  - To join a circular metal with a flat job
  - For jobs carrying shear stress
  - For jobs of dissimilar materials
  - For welding at selected spots only.
293. For resistance welding
- Voltage is low and current is high \*
  - Voltage is high and current is low
  - Both voltage and current are high
  - Both voltage and current are low
  - None of the above.
294. Which of the following welding process is preferred for wrought iron ?
- Spot welding
  - Thermit welding
  - Lesser welding
  - Mig welding
  - Forge welding.\*
295. For which of the following material TIG welding is preferred ?
- Mild steel
  - Stainless steel
  - Aluminium \*
  - Silver
  - Gold.

296. The gases used in tungsten inert gas welding are  
 a. Helium and neon  
 b. Argon and helium \*  
 c. Ozone and neon  
 d. Carbondioxide and nitrogen  
 e. Atomic hydrogen and neon.
297. Which of the following material is difficult to be spot welded ?  
 a. Cold rolled mild steel sheet  
 b. Hot rolled mild steel sheet  
 c. Stainless steel  
 d. Copper \*  
 e. None of the above.
298. In which of the following welding process the two pieces to be joined are over-lapped and placed between two electrodes ?  
 a. Spot welding \*                      b. Seam welding  
 c. Butt welding                          d. Percussion welding  
 e. Projection welding.
299. Which of the following is a multispot welding process?  
 a. Seam welding                      b. Percussion welding  
 c. Projection welding \*              d. Thermit welding  
 e. Atomic hydrogen welding.
300. Joggled welded joints are used  
 a. For heavy loading where the upper surface of both pieces must be in the same plane \*  
 b. For light loading where the upper surface of both pieces must be in contact  
 c. For jobs subjected to fatigue stresses  
 d. For joining two dissimilar metals  
 e. For joining two materials of different thicknesses.
301. During arc welding eyes need to be protected against  
 a. Intense glare  
 b. Microwaves  
 c. High frequency waves  
 d. Infrared and ultraviolet rays  
 e. X-rays and gamma rays.\*
302. For welding of non-ferrous materials which of the following is preferred ?  
 a. Direct current \*  
 b. Low frequency ac.  
 c. High frequency ac  
 d. Microwave frequency voltage  
 e. Induction heating.
303. In gas welding, the maximum flame temperature occurs at  
 a. The tip of the flame  
 b. The inner cone  
 c. The outer cone  
 d. Next to the inner cone \*  
 e. Inside the inner cone.
304. During arc welding the welding speed is too low, it is likely to result in  
 a. Excessive pilling up of weld metal  
 b. Overlapping without penetration edges  
 c. Wastage of electrode material  
 d. All of the above \*  
 e. None of the above.
305. The welding of steel structures on the site of a building is done by  
 a. Spot welding                          b. Projection welding  
 c. Arc welding \*                          d. TIG welding  
 e. Thermit welding.
306. In which of the following welding process the transfer of metal from the electrode occurs due to molecular attraction ?  
 a. Metallic arc welding \*  
 b. Gas welding                          c. Thermit welding  
 d. DC arc welding                      e. None of the above.
307. In which of the following process the electrode is not consumed ?  
 a. TIG welding \*                          b. DC arc welding  
 c. Gas welding                          d. Plasma welding  
 e. Laser welding.
308. Filler metal is essentially used in which of the following welding process ?  
 a. Spot welding                          b. Seam welding  
 c. Projection welding                  d. Gas welding \*  
 e. All of the above.
309. In which of the following welding process, flux is used in the form of granules ?  
 a. Submerged arc welding \*  
 b. Gas arc welding                      c. DC arc welding  
 d. Argon arc welding                  e. All of the above.
310. A non-consumable electrode is used in  
 a. Gas welding                          b. DC arc welding  
 c. AC arc welding                      d. Argon arc welding \*  
 e. None of the above.
311. During MIG welding the metal is transferred in the form of  
 a. Continuous flow of molten metal  
 b. A fine spray of metal \*  
 c. Electron beam  
 d. Solution  
 e. Metal is not transferred during MIG welding.
312. Which of the following is often used as flux in brazing process ?  
 a. Turpentine  
 b. Fevicol  
 c. Ammonia chloride  
 d. Iron dust  
 e. Borax.\*

313. Post cleaning is done in case of brazed joints to
- Prevent corrosion \*
  - Remove scale
  - Strengthen the joint
  - Increase the strength of the joint
  - All of the above.
314. Electronic components are often joined by
- Adhesive
  - Soldering \*
  - Brazing
  - Spot welding
  - Seam welding.
315. A collimated light beam is used for producing heat in
- TIG welding
  - MIG welding
  - Percussion welding
  - Laser welding \*
  - Plasma welding.
316. For ultrasonic welding the thickness of metal is usually restricted to
- 3 mm \*
  - 6 mm
  - 10mm
  - 15 mm
  - 25 mm.
317. Which of the following process is preferred for cutting and welding of nonferrous metals ?
- Submerged arc welding
  - Inert gas arc welding \*
  - MIG welding
  - DC arc welding
  - None of the above.
318. Which of the following is relatively a low temperature brazing process ?
- Copper brazing
  - Brass brazing
  - Nickel chrome brazing
  - Silver brazing \*
  - Silver manganese brazing.
319. Which of the following process provides continuous welds between two sheets ?
- Projection welding
  - Spot welding
  - Seam welding \*
  - All of the above.
320. In Gas Tungsten Arc (GTA) welding, a stream of inert gas is used to
- concentrate the heat of the arc and prevent its dissipation.
  - prevent the formation of oxides in the puddle.\*
  - lower the temperature required to properly fuse the metal.
321. Which statement best describes magnesium welding?
- Filler rod should be of nickel steel.
  - Magnesium can be welded to other metals.
  - Filler rod should be of the same composition as base metal.\*
322. Which statement is true in regard to welding heat-treated magnesium?
- magnesium cannot be repaired by fusion welding because of the high probability of igniting the metal.
  - Flux should not be used because it is very difficult to remove and is likely to cause corrosion.
  - The welded section does not have the strength of the original metal.\*
323. The oxyacetylene flame for silver soldering should be
- carburizing.
  - oxidizing.
  - neutral.\*
324. Why is it necessary to use flux in all silver soldering operations?
- To chemically clean the base metal of oxide film.\*
  - To prevent overheating of the base metal.
  - To increase heat conductivity.
325. Engine mount members should preferably be repaired by using a
- smaller diameter tube with fishmouth and rosette welds.
  - larger diameter tube with fishmouth and no rosette welds.
  - larger diameter tube with fishmouth and rosette welds.\*
326. What method of repair is recommended for a steel tube longeron dented at a cluster?
- Welded patch plate.\*
  - Welded split sleeve.
  - Welded outer sleeve.
327. Welding over brazed or soldered joints is
- not permitted.\*
  - permissible for mild steel.
  - permissible for most metals or alloys that are not heat treated.
328. Which statement concerning soldering is correct?
- Joints in electric wire to be soldered should be mechanically secured prior to soldering. \*
  - Changeable shades of blue can be observed on the surface of a copper soldering tip when the proper temperature for soldering has been reached.
  - If the soldering temperature is too high, the solder will form in lumps and not produce a positive bond.
329. A resurfaced soldering iron cannot be used effectively until after the working face has been
- tinned.\*
  - fluxed.
  - polished.

330. Which of the following can normally be welded without adversely affecting strength?
1. Aircraft bolts.
  2. SAE 4130 chrome/molybdenum tubing.
  3. Spring steel struts.
  4. Most heat-treated steel/nickel alloy components.
- a. 2.\*
  - b. 2 and 4.
  - c. 1 and 3.
331. In selecting a torch tip size to use in welding, the size of the tip opening determines the
- a. melting point of the filler metal.
  - b. temperature of the flame.
  - c. amount of heat applied to the work.\*
332. Why should a carburizing flame be avoided when welding steel?
- a. It hardens the surface.\*
  - b. It removes the carbon content.
  - c. A cold weld will result.
333. The most important consideration(s) when selecting welding rod is/are
- a. current setting or flame temperature.
  - b. material compatibility.\*
  - c. ambient conditions.
334. The oxyacetylene flame used for aluminum welding should
- a. be neutral and soft.\*
  - b. contain an excess of acetylene and leave the tip at a relatively low speed.
  - c. be slightly oxidizing.
335. A very thin and pointed tip on a soldering copper is undesirable because it will
- a. transfer too much heat to the work.
  - b. have a tendency to overheat and become brittle.
  - c. cool too rapidly.\*
336. Filing or grinding a weld bead
- a. may be performed to achieve a smoother surface.
  - b. reduces the strength of the joint.\*
  - c. may be necessary to avoid adding excess weight or to achieve uniform material thickness.
337. Acetylene at a line pressure above 15 PSI
- a. is dangerously unstable.\*
  - b. should be used when a reducing flame is necessary.
  - c. is usually necessary when welding metal over 3/8-inch thick.
338. Cylinders used to transport and store acetylene
- a. are green in color.
  - b. contain acetone.\*
  - c. are pressure tested to 3,000 PSI.
339. A welding torch backfire may be caused by
- a. using too much acetylene.
  - b. a loose tip.\*
  - c. a tip temperature that is too cool.
340. Which statement concerning a welding process is true?
- a. The inert arc welding process uses an inert gas to protect the weld zone from the atmosphere.\*
  - b. In the oxyacetylene welding process, the filler rod used for steel is covered with a thin coating of flux.
  - c. In the metallic arc welding process, filler material, if needed, is provided by a separate metal rod of the proper material held in the arc.
341. Where should the flux be applied when oxyacetylene welding aluminum?
- a. Applied only to the welding rod.
  - b. Painted on the surface to be welded and applied to the welding rod.\*
  - c. Painted only on the surface to be welded.
342. What purpose does flux serve in welding aluminum?
- a. Removes dirt, grease, and oil.
  - b. Minimizes or prevents oxidation.\*
  - c. Ensures proper distribution of the filler rod.
343. Why are aluminum plates 1/4 inch or more thick usually preheated before welding?
- a. Reduces internal stresses and assures more complete penetration.\*
  - b. Reduces welding time.
  - c. Prevents corrosion and ensures proper distribution of flux.
344. How should a welding torch flame be adjusted to weld stainless steel?
- a. Neutral.
  - b. Slightly oxidizing.
  - c. Slightly carburizing.\*
345. Oxides form very rapidly when alloys or metals are hot. It is important, therefore when welding aluminum to use a
- a. filler.
  - b. solvent.
  - c. flux.\*
346. In gas welding, the amount of heat applied to the material being welded is controlled by the
- a. distance the tip is held from the work.
  - b. amount of gas pressure used.
  - c. size of the tip opening.\*
347. Oxygen and acetylene cylinders are made of
- a. bronze.
  - b. seamless aluminum.
  - c. steel.\*
348. When inspecting a butt welded joint by visual means.
- a. look for evidence of excessive heat in the form of a very high bead.
  - b. the penetration should be 100 percent of the thickness of the base metal.\*
  - c. the penetration should be 25 to 50 percent of the thickness of the base metal.



349. Annealing of aluminum
- increases the tensile strength
  - makes the material brittle.
  - removes stresses caused by forming.\*
350. Edge notching is generally recommended in butt welding above a certain thickness of aluminum because it
- aids in getting full penetration of the metal and prevents local distortion.\*
  - helps hold the metal in alignment during welding.
  - aids in the removal or penetration of oxides on the metal surface.
351. If too much acetylene is used in the welding of stainless steel,
- oxide will be formed on the base metal close to the weld.
  - a porous weld will result.
  - the metal will absorb carbon and lose its resistance to corrosion.\*
352. The shielding gases generally used in the Gas Tungsten Arc (GTA) welding of aluminum consist of
- a mixture of nitrogen and carbon dioxide.
  - helium or argon, or a mixture of helium and argon.\*
  - nitrogen or hydrogen, or a mixture of nitrogen and hydrogen.
353. The main functions of coatings on the electric arc welding electrodes are
- isolating the welding zone from ambient air
  - enabling smooth merging of weld metal with base metal
  - enable stable burning of the arc
  - facilitate striking of arc
  - all of the above \*
354. The primary reason for using flux when welding aluminum is to
- prevent oxides from forming ahead of the weld \*
  - promote better fusion of the base metal at a lower temperature
  - prevent molten metal from flowing too widely
  - clean the base metal ahead of the weld.
355. Magnesium aircraft structural members are usually heat treated. Which statement is true concerning the welding of heat treated magnesium ?
- The welded section can never have the strength of the original metal \*
  - Flux should not be used as it causes corrosion to commence
  - Use an oxidizing flame held at a flat angle to the work
  - Magnesium cannot be repaired by fusion welding.
356. The oxyacetylene flame for silver soldering should be
- harsh
  - oxidizing
  - neutral \*
  - carburizing.
357. It is necessary to use flux in all silver soldering operations so as to
- chemically clean the base metal of oxide film \*
  - prevent overheating of the base metal
  - increase the strength of the joint and save the expensive silver solder
  - increase heat conductivity.
358. Engine mount members should preferably be repaired by using
- a larger diameter tube with fishmouth and no rosette welds
  - a larger diameter tube with fishmouth and rosette welds \*
  - a smaller diameter tube with fishmouth and rosette welds
  - a larger diameter tube with 30° cuts and rosette welds.
359. The method of repair is recommended for a steel tube longeron dented at a cluster is
- Welded split sleeve
  - Welded outer sleeve
  - Welded patch plate \*
  - Welded inner sleeve.
360. In aircraft welding, the usual practice in the selection of a welding tip is to use
- the type of material to be welded as the primary basis for selection \*
  - a tip with a hole size equal to the diameter of the welding rod used
  - as small a tip as possible with the tip adjusted to the maximum operating range
  - as large a tip as possible with the tip adjusted to the maximum operating range.
361. Carburizing flame is avoided when welding steel because
- It remove the carbon content
  - It hardness the surface \*
  - It causes excessive sparking
  - A cold weld will result.
362. When welding a tank fabricated from 710 sheet aluminum, a welding tip slightly larger than that used for welding steel of the same thickness should be used to obtain sufficient heat to melt the base metal. The flame used for aluminum welding should
- be neutral and soft \*
  - be slightly oxidizing
  - contain an excess of acetylene and leave the tip at a relatively low speed
  - contain an excess of acetylene and leave the tip at a relatively high speed.
363. New or resurfaced soldering copper tip should be tinned or coated with solder so as to
- aid in the transfer of heat from the soldering tip to the joint to be soldered
  - prevent the soldering tip from overheating the joint to be soldered \*
  - prevent excessive heat from being radiated from the tip
  - None of these.

364. A very thin and pointed tip on a soldering copper is undesirable because it will
- burn the alloys out of the solder
  - be very difficult to tin
  - cool to rapidly \*
  - punch holes in the metal being soldered.
365. The characteristics of a gas weld which is successfully completed will be
- The finish weld should have a rough seam and be non-uniform in thickness
  - The weld metal should be tapered smoothly into the base metal \*
  - Oxide should be formed on the base metal close to the weld
  - The base metal should show signs of pits.
366. An acceptable line pressure for acetylene is
- 5 PSI
  - 18 PSI
  - 22 PSI
  - the same as the oxygen pressure.\*
367. Cylinders used to transport and store acetylene
- are purged after each use
  - are pressure tested to 2,000 PSI
  - are green in color
  - contain acetone.\*
368. Which of the following statements concerning a welding process is true ?
- The inert-arc welding process uses an inert gas to protect the weld zone from the atmosphere \*
  - In the metallic-arc welding process, filler material if needed, is provided by a separate metal rod of the proper material held in the arc
  - In the carbon-arc welding process, filler material, if needed, is provided by the arc
  - In the oxyacetylene welding process, the filler rod used for steel is covered with a thin coating of flux.
369. Flux is applied when oxyacetylene welding aluminum in the form :
- Painted only on the surface to be welded
  - Painted on the surface to be welded and applied to the welding rod \*
  - Applied only to the welding rod
  - Painted on the surface to be welded and applied to the welding rod after tack weld..
370. Oxides form very rapidly when alloys or metals are hot. It is important, therefore, when welding aluminum to use a
- |            |           |
|------------|-----------|
| a. solvent | b. float  |
| c. filler  | d. flux.* |
371. In gas welding, the amount of heat applied to the material being welded is controlled by
- the amount of gas pressure used
  - the size of the tip opening \*
  - the distance the tip is held from the work
  - the temperature of the flame.
372. Oxygen and acetylene cylinders are made of
- heat-treated seamless copper
  - seamless aluminum \*
  - steel
  - bronze.
373. When inspecting a butt welded joint by visual means
- the penetration should be 25 percent to 50 percent of the thickness of the base metal
  - the width of the bead should be twice the thickness of the base metal
  - the penetration should be 100 percent of the thickness of the base metal
  - look for evidence of excessive heat in the form of a very high bead.\*





11. Which of these will cause the resistance of a conductor to decrease ?
  - a. Decrease the length or the cross-sectional area.
  - b. Decrease the length or increase the cross-sectional area.\*
  - c. Increase the length or decrease the cross-sectional area.
  
12. Through which material will magnetic lines of force pass the most readily ?
  - a. Copper
  - b. Iron.\*
  - c. Aluminium.
  
13. The voltage drop in a conductor of known resistance is dependent on
  - a. the voltage of the circuit.
  - b. only the resistance of the conductor and does not change with a change in either voltage or amperage.
  - c. the amperage of the circuit.\*
  
14. A thermal switch, as used in an electric motor, is designed to
  - a. close the integral fan circuit to allow cooling of the motor.
  - b. open the circuit in order to allow cooling of the motor.\*
  - c. reroute the circuit to ground.
  
15. (Refer figure to 9.3) Which of the components is a potentiometer ?
  - a. 5.
  - b. 3.\*
  - c. 11.
  
16. (Refer figure to 9.3) The electrical symbol represented at number 5 is a variable
  - a. inductor.
  - b. resistor.
  - c. capacitor.\*

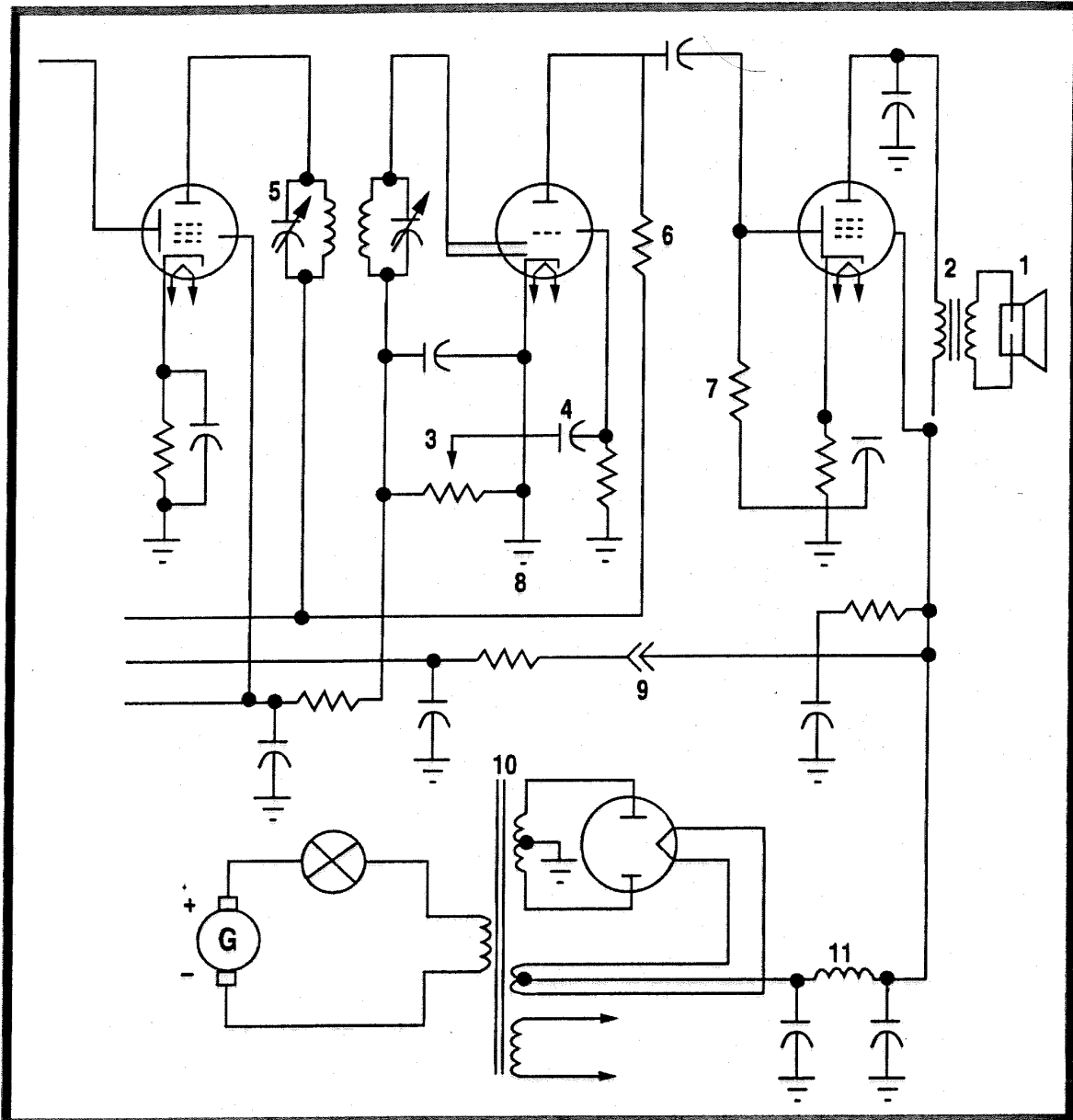


Fig. 9.3. Electrical Symbols.

17. (Refer to figure 9.4) Which symbol represents a variable resistor ?
- 2.\*
  - 1.
  - 3.

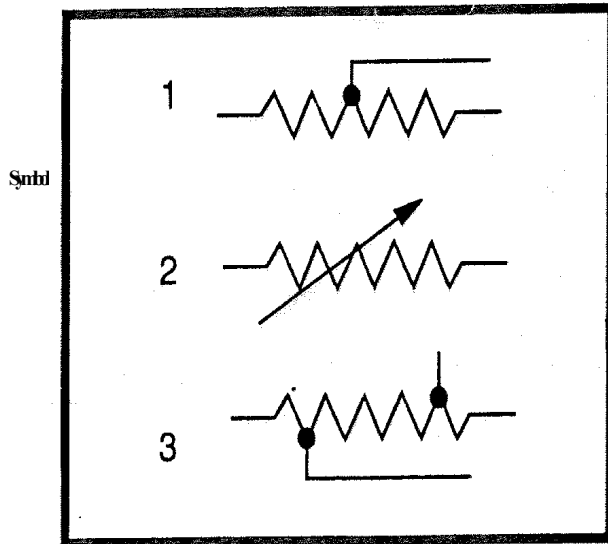


Fig. 9.4. Electrical

18. How much current does a 30 volt motor, 1/2 horsepower, 85 percent efficient draw from the bus ?  
(Note : 1 horsepower = 746 watts)
- 14.6 amperes.\*
  - 12.4 amperes.
  - 14.1 amperes.
19. Which requires the most electrical power during operation ?  
(Note : 1 horsepower = 746 watts)
- A 12-volt motor requiring 8 amperes.
  - Four 30-watt lamps in a 12-volt parallel circuit.
  - Two lights requiring 3 amperes each in a 24-volt parallel system.\*
20. How many amperes will a 28-volt generator be required to supply to a circuit containing five lamps in parallel, three of which have a resistance of 6 ohms each and two of which have a resistance of 5 ohms each ?
- 1.11 amperes.
  - 1 ampere.
  - 25.23 amperes.\*
21. A 24-volt source is required to furnish 48 watts to a parallel circuit consisting of four resistors of equal value. What is the voltage drop across each resistor ?
- 12 volts.
  - 3 volts.
  - 24 volts.\*
22. (Refer to figure 9.5) If resistor  $R_5$  is disconnected at the junction of  $R_4$  and  $R_3$  as shown, what will the ohmmeter read ?
- 2.76 ohms.
  - 3 ohms.\*
  - 12 ohms.
23. (Refer to figure 9.6) If resistor  $R_3$  is disconnected at terminal D, what will the ohmmeter read ?
- Infinite resistance.\*
  - 10 ohms.
  - 20 ohms.
24. (Refer to figure 9.7) With an ohmmeter connected into the circuit as shown, what will the ohmmeter read ?
- 20 ohms.
  - Infinite resistance.
  - 10 ohms.\*
25. A cabin entry of 10 watts and a dome light of 20 watts are connected in parallel to a 30-volt source. If the voltage across the 10-watt light is measured, it will be
- equal to the voltage across the 20-watt light.\*
  - half the voltage across the 20-watt light.
  - one-third of the input voltage.
26. A 14-ohm resistor is to be installed in a series circuit carrying .05 ampere. How much power will the resistor be required to dissipate ?
- At least .70 milliwatt.
  - At least 35 milliwatts.\*
  - Less than .035 watt.
27. (Refer to figure 9.8) What is the measured voltage of the series-parallel circuit between terminals A and B ?
- 1.5 volts.
  - 3.0 volts.\*
  - 4.5 volts.
28. A 24-volt source is required to furnish 48 watts to a parallel circuit consisting of two resistors of equal value. What is the value of each resistor ?  
(Note :  $R_T = E^2/P$ )
- 24 ohms.\*
  - 12 ohms.
  - 6 ohms.
29. Which requires the most electrical power ?  
(Note : 1 horsepower = 746 watts)
- Four 30-watt lamps arranged in a 12 volt parallel circuit.
  - A 1/5 horsepower, 24-volt motor which is 75 percent efficient.
  - A 24-volt anticollision light circuit consisting of two light assemblies which require 3 amperes each during operation.\*

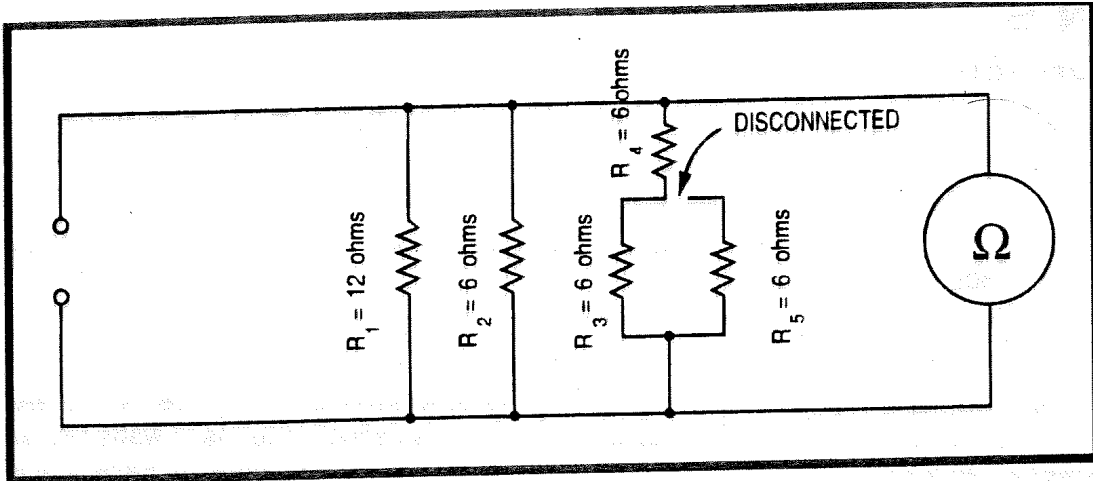


Fig. 9.5. Circuit Diagram.

- 30. What is the operating resistance of a 30-watt light bulb designed for a 28-volt system ?
  - a. 1.07 ohms.
  - b. 26 ohms.\*
  - c. 0.93 ohm.
- 31. Which statement is correct when made in reference to a parallel circuit ?
  - a. The current is equal in all portions of the circuit.
  - b. The total current is equal to the sum of the currents through the individual branches of the circuit.\*
  - c. The current in amperes can be found by dividing the EMF in volts by the sum of the resistors in ohms.
- 32. If three resistors of 3 ohms, 5 ohms and 22 ohms are connected in series in a 28-volt circuit, how much current will flow through the 3-ohm resistor ?
  - a. 9.3 amperes.
  - b. 1.05 amperes.
  - c. 0.93 amperes.\*
- 33. A circuit has an applied voltage of 30 volts and a load consisting of a 10-ohm resistor in series with a 20-ohm resistor. What is the voltage drop across the 10-ohm resistor ?
  - a. 10 volts.\*
  - b. 20 volts.
  - c. 30 volts.

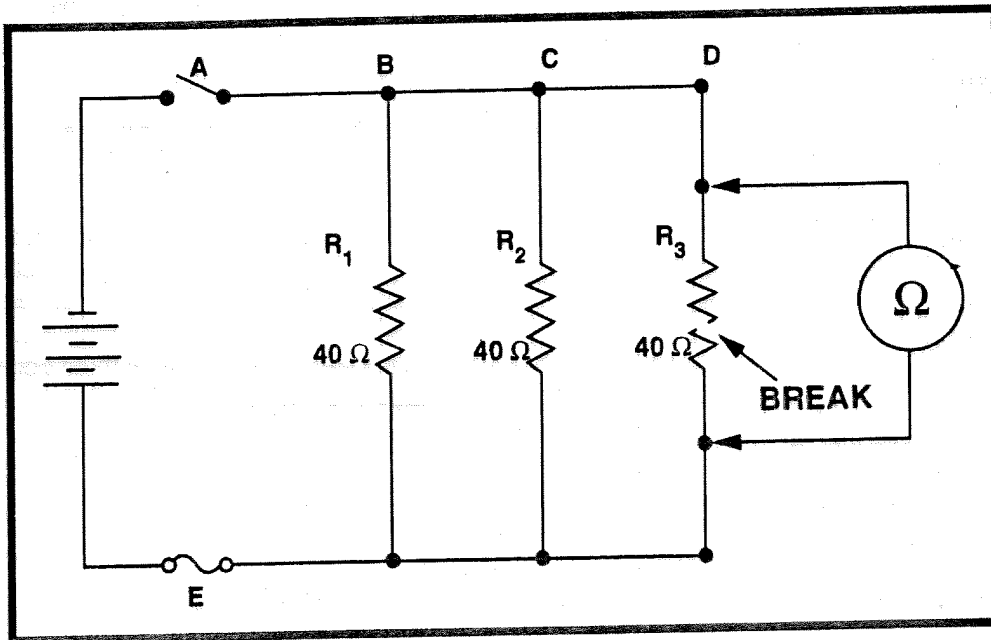


Fig. 9.6. Circuit Diagram.

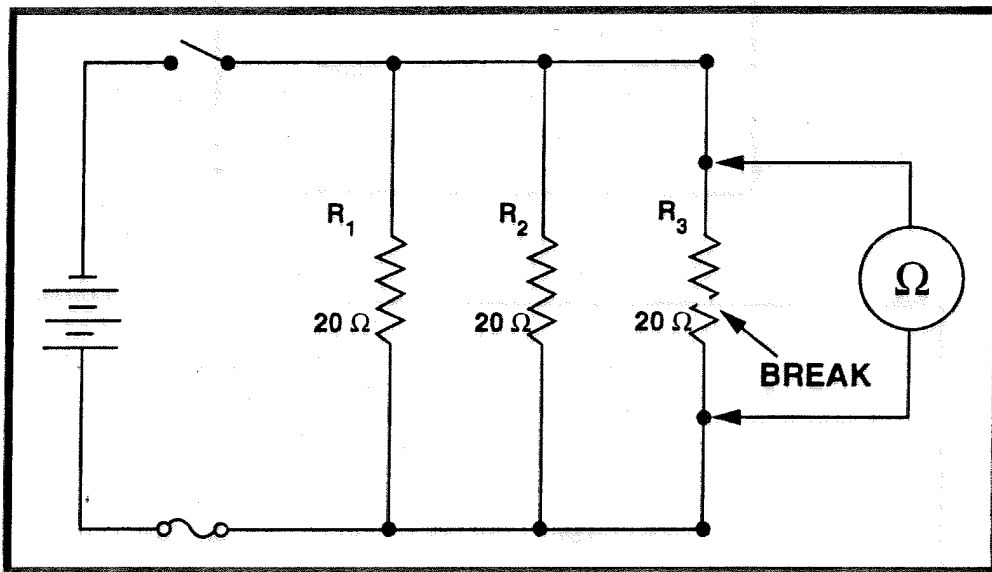


Fig. 9.7. Circuit Diagram.

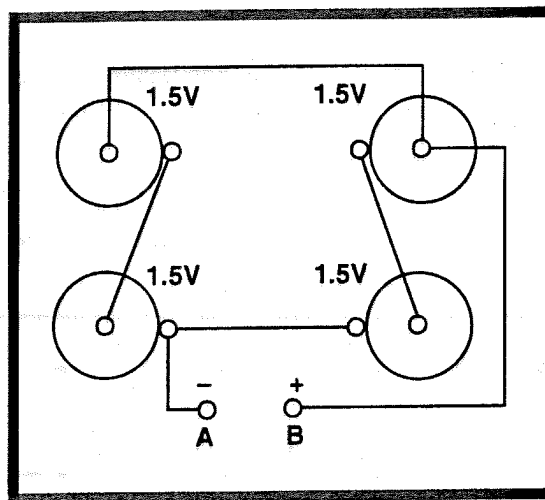


Fig. 9.8. Battery Circuit.

34. (Refer to figure 9.9) Find the total current flowing in the wire between points C and D.
- 6.0 amperes.
  - 2.4 amperes.
  - 3.0 amperes.\*
35. (Refer to figure 9.9) Find the voltage across the 8-ohm resistor.
- 8 volts.
  - 20.4 volts.
  - 24 volts.\*

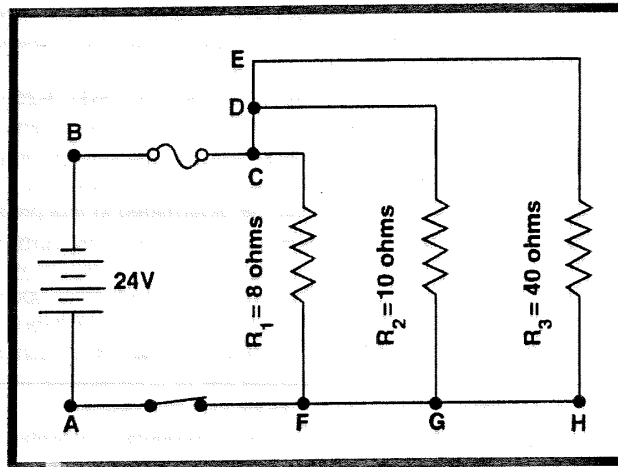


Fig. 9.9. Circuit Diagram.

36. (Refer to figure 9.10) Find the total resistance of the circuit.
- 16 ohms.
  - 2.6 ohms.
  - 21.2 ohms.\*
40. A 48-volt source is required to furnish 192 watts to a parallel circuit consisting of three resistors of equal value. What is the value of each resistor?
- 36 ohms.\*
  - 4 ohms.
  - 12 ohms.

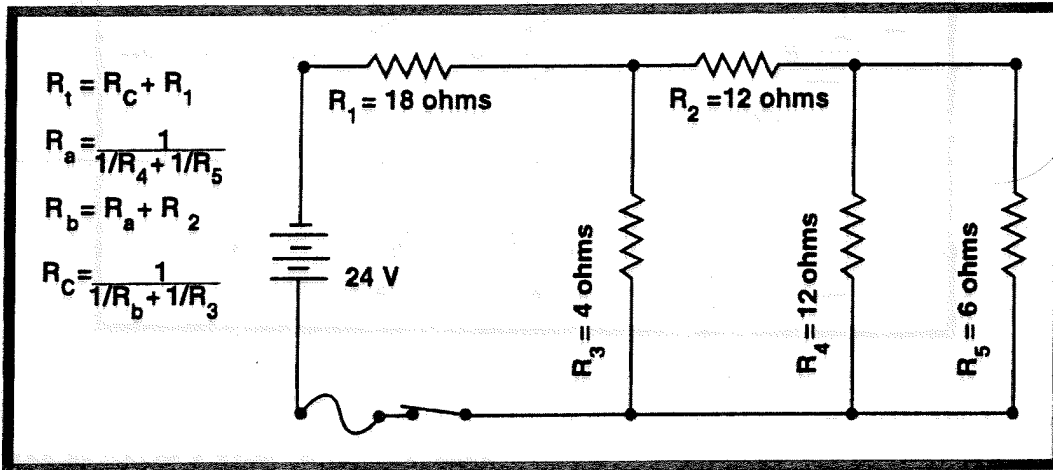


Fig. 9.10. Circuit Diagram.

37. Which is correct in reference to electrical resistance ?
- Two electrical devices will have the same combined resistance if they are connected in series as they will have if connected in parallel.
  - If one of three bulbs in a parallel lighting circuit is removed, the total resistance of the circuit will become greater.\*
  - An electrical device that has a high resistance will use more power than one with a low resistance with the same applied voltage.
38. (Refer to figure 9.11) Determine the total current flow in the circuit.
- 0.2 ampere.
  - 1.4 ampere.\*
  - 0.8 ampere.
39. (Refer to figure 9.12) The total resistance of the circuit is
- 25 ohms.
  - 35 ohms.
  - 17 ohms.\*
41. Which is correct concerning a parallel circuit ?
- Total resistance will be smaller than the smallest resistor.\*
  - Total resistance will decrease when one of the resistances is removed.
  - Total voltage drop is the same as the total resistance.
42. A lead-acid battery with 12 cells connected in series (no-load voltage = 2.1 volts per cell) furnishes 10 amperes to a load of 2-ohms resistance. The internal resistance of the battery in this instance is
- 0.52 ohm.\*
  - 2.52 ohms.
  - 5.0 ohms.



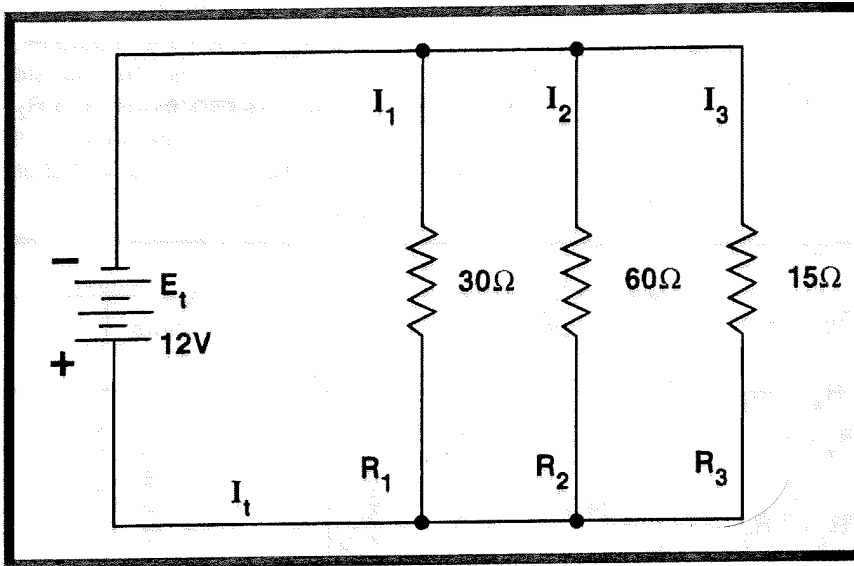


Fig. 9.11. Circuit Diagram.

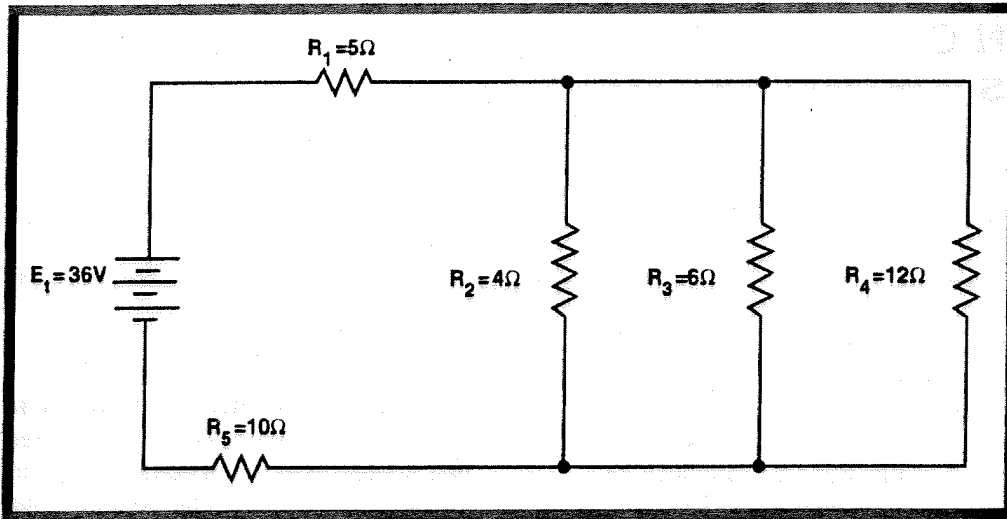


Fig. 9.12. Circuit Diagram.

43. If electrolyte from a lead-acid battery is spilled in the battery compartment, which procedure should be followed ?
  - a. Apply boric acid solution to the affected area followed by a water rinse.
  - b. Rinse the affected area thoroughly with clean water.
  - c. Apply sodium bicarbonate solution to the affected area followed by a water rinse.\*
44. Which statement regarding the hydrometer reading of a lead-acid storage battery electrolyte is true ?
  - a. The hydrometer reading does not require a temperature correction if the electrolyte temperature is 80°F.\*
  - b. A specific gravity correction should be subtracted from the hydrometer reading if the electrolyte temperature is above 20°F.
  - c. The hydrometer reading will give a true indication of the capacity of the battery regardless of the electrolyte temperature.
45. A fully charged lead-acid battery will not freeze until extremely low temperatures are reached because
  - a. the acid is in the plates, thereby increasing the specific gravity of the solution.
  - b. most of the acid is in the solution.\*
  - c. increased internal resistance generates sufficient heat to prevent freezing.
46. What determines the amount of current which will flow through a battery while it is being charged by a constant voltage source ?
  - a. The total plate area of the battery.
  - b. The state-of-charge of the battery.\*
  - c. The ampere-hour capacity of the battery.

47. Which of the following statements is/are generally true regarding the charging of several aircraft batteries together ?
- Batteries of different voltages (but similar capacities) can be connected in series with each other across the charger, and charged using the constant current method.
  - Batteries of different ampere-hour capacity and same voltage can be connected in parallel with each other across the charger, and charged using the constant voltage method.
  - Batteries of the same voltage and same ampere-hour capacity must be connected in series with each other across the charger, and charged using the constant current method.
- 3.
  - 2 and 3.
  - 1 and 2.\*
48. The method used to rapidly charge a nickel-cadmium battery utilizes
- constant current and constant voltage.
  - constant current and varying voltage.
  - constant voltage and varying current.\*
49. If an aircraft ammeter shows a full charging rate, but the battery remains in a discharged state, the most likely cause is
- an externally shorted battery.
  - an internally shorted battery.\*
  - a shorted generator field circuit.
50. Which condition is an indication of improperly torqued cell link connections of nickel-cadmium battery ?
- Light spewing at the cell caps.
  - Toxic and corrosive deposit of potassium carbonate crystals.
  - Heat or burn marks on the hardware.\*
51. The presence of small amounts of potassium carbonate deposits on the top of nickel-cadmium battery cells that have been in service for a time is an indication of
- normal operation.\*
  - excessive gassing.
  - excessive plate sulfation.
52. The servicing and charging of nickel-cadmium and lead-acid batteries together in the same service area is likely to result in
- normal battery service life.
  - increased explosion and/or fire hazard.
  - contamination of both types of batteries.\*
53. The electrolyte of a nickel-cadmium battery is the lowest when the battery is
- being charged.
  - in a discharged condition.\*
  - under a heavy load condition.
54. The end-of-charge voltage of a 19-cell nickel-cadmium battery, measured while still on charge.
- must be 1.2 to 1.3 volts per cell.
  - must be 1.4 volts per cell.
  - depends upon its temperature and the method used for charging.\*
55. Nickel-cadmium batteries which are stored for a long period of time will show a low liquid level because
- of the decrease in the specific gravity of the electrolyte.
  - electrolyte evaporates through the vents.
  - electrolyte becomes absorbed into the plates.\*
56. How can the state-of-charge of a nickel-cadmium battery be determined ?
- By measuring the specific gravity of the electrolyte.
  - By a measured discharge.\*
  - By the level of the electrolyte.
57. What may result if water is added to a nickel-cadmium battery when it is not fully charged ?
- Excessive electrolyte dilution.
  - Excessive spewing is likely to occur during the charging cycle.\*
  - No adverse effects since water may be added anytime.
58. In nickel-cadmium batteries, a rise in cell temperature
- causes an increase in internal resistance.
  - causes a decrease in internal resistance.\*
  - increases cell voltage.
59. When a charging current is applied to a nickel-cadmium battery, the cells emit gas only
- toward the end of the charging cycle.\*
  - when the electrolyte level is low.
  - if they are defective.
60. Nickel-cadmium battery cases and drain surfaces which have been affected by electrolyte should be neutralized with a solution of
- boric acid.\*
  - sodium bicarbonate.
  - potassium hydroxide.
61. The working voltage of a capacitor in an ac circuit should be
- equal to the highest applied voltage
  - at least 20 percent greater than the highest applied voltage
  - at least 50 percent greater than the highest applied voltage \*
62. The term that describes the combined resistive forces in an ac circuit is
- resistance.
  - reactance.
  - impedance.\*

63. The basis for transformer operation in the use of alternating current is mutual.  
a. inductance.\*                      b. capacitance.  
c. reactance.
64. The opposition offered by a coil to the flow of alternating current is called (disregard resistance)  
a. impedance.  
b. reluctance.  
c. inductive reactance.\*
65. An increase in which of the following factors will cause an increase in the inductive reactance of a circuit ?  
a. Inductance and frequency.\*  
b. Resistance and voltage.  
c. Resistance and capacitive reactance.
66. (Refer to Equation 9.1) When different rated capacitors are connected in series in a circuit, the total capacitance is  
a. less than the capacitance of the lowest rated capacitor.\*  
b. greater than the capacitance of the highest rated capacitor.  
c. equal to the sum of all the capacitances.
71. When different rated capacitors are connected in parallel in a circuit, the total capacitance is  
(Note :  $C_T = C_1 + C_2 + C_3 \dots$ )  
a. less than the capacitance of the lowest rated capacitor.  
b. equal to the capacitance of the highest rated capacitor.  
c. equal to the sum of all the capacitances.\*
72. When inductors are connected in series in a circuit, the total inductance is (where the magnetic fields of each do not affect the others)  
(Note :  $L_T = L_1 + L_2 + L_3 \dots$ )  
a. less than the inductance of the lowest rated inductor.  
b. equal to the inductance of the highest rated inductor.  
c. equal to the sum of the individual inductances.\*
73. (Refer to Equation 9.3) When more than two inductors of different inductance are connected in parallel in a circuit, the total inductance is  
a. less than inductance of the lowest rated inductor\*.  
b. equal to the inductance of the highest rated inductor.  
c. equal to the sum of the individual inductances.

$$C_T = \frac{1}{1/C_1 + 1/C_2 + 1/C_3 \dots}$$

Equation.9.1

$$L_T = \frac{1}{1/L_1 + 1/L_2 + 1/L_3 \dots}$$

Equation.9.3

67. In an ac circuit, the effective voltage is  
a. equal to the maximum instantaneous voltage.  
b. greater than the maximum instantaneous voltage.  
c. less than the maximum instantaneous voltage.\*
68. The amount of electricity a capacitor can store is directly proportional to the  
a. distance between the plates and inversely proportional to the plate area.  
b. plate area and is not affected by the distance between the plates.  
c. plate area and inversely proportional to the distance between the plates.\*
69. (Refer to Equation 9.2) What is the total capacitance of a certain circuit containing three capacitors with capacitances of .02 microfarad, .05 microfarad, and .10 microfarad, respectively ?  
a. 5.88  $\mu$ F.                              b. 0.125 pF.  
c. .0125  $\mu$ F.\*
74. What is the total capacitance of a certain circuit containing three capacitors with capacitances of .25 microfarad, .03 microfarad, and .12 microfarad,  
(Note :  $C_T = C_1 + C_2 + C_3$ )  
a. .4  $\mu$ F.\*                              b. .04 pF.  
c. .04  $\mu$ F.
75. When calculating power in a reactive or inductive ac circuit, the true power is  
a. more than the apparent power.  
b. less than the apparent power in a reactive circuit and more than the apparent power in an inductive circuit.  
c. less than the apparent power.\*
76. (Refer to Equation 9.4) What is the impedance of an ac-series circuit consisting of an inductor with a reactance of 10 ohms, a capacitor with a reactance of 4 ohms, and a resistor with a resistance of 8 ohms ?  
a. 22 ohms.                              b. 5.29 ohms.  
c. 10 ohms.\*

$$C_T = \frac{1}{1/C_1 + 1/C_2 + 1/C_3}$$

Equation.9.2

$$Z = \sqrt{R^2 + (X_L - X_C)^2}$$

Z = Impedance

R = Resistance

 $X_L$  = Inductance Reactance $X_C$  = Capacitive Reactance

Equation 9.4

70. Unless otherwise specified, any values given for current or voltage in an ac circuit are assumed to be  
a. instantaneous values.    b. effective values.\*  
c. maximum values.

- 77. Transfer of electrical energy from one conductor to another without the aid of electrical connections
  - a. is called induction.\*
  - b. is called airgap transfer.
  - c. will cause excessive arcing and heat, and as a result is impractical.
- 78. What happens to the current in a voltage step-up transformer with a ratio of 1 to 4 ?
  - a. The current is stepped down by a 1 to 4 ratio.\*
  - b. The current is stepped up by a 1 to 4 ratio.
  - c. The current does not change.
- 79. Diodes are used in electrical power circuits primarily as
  - a. cutout switches.
  - b. rectifiers.\*
  - c. relays.
- 80. In a P-N-P transistor application, the solid state device is turned on when the
  - a. base is negative with respect to the emitter.\*
  - b. base is positive with respect to the emitter.
  - c. emitter is negative with respect to the base.
- 81. In an N-P-N transistor application, the solid state device is turned on when the
  - a. emitter is positive with respect to the base.
  - b. base is negative with respect to the emitter.
  - c. base is positive with respect to the emitter.\*
- 82. Typical application for zener diodes is as
  - a. full-wave rectifiers.
  - b. half-wave rectifiers.
  - c. voltage regulators.\*
- 83. (Refer to figure 9.13) Which illustration is correct concerning bias application and current flow ?
  - a. 1.\*
  - b. 2.
  - c. 3.
- 84. Forward biasing of a solid state device will cause the device to
  - a. conduct via zener breakdown.
  - b. conduct.\*
  - c. turn off.

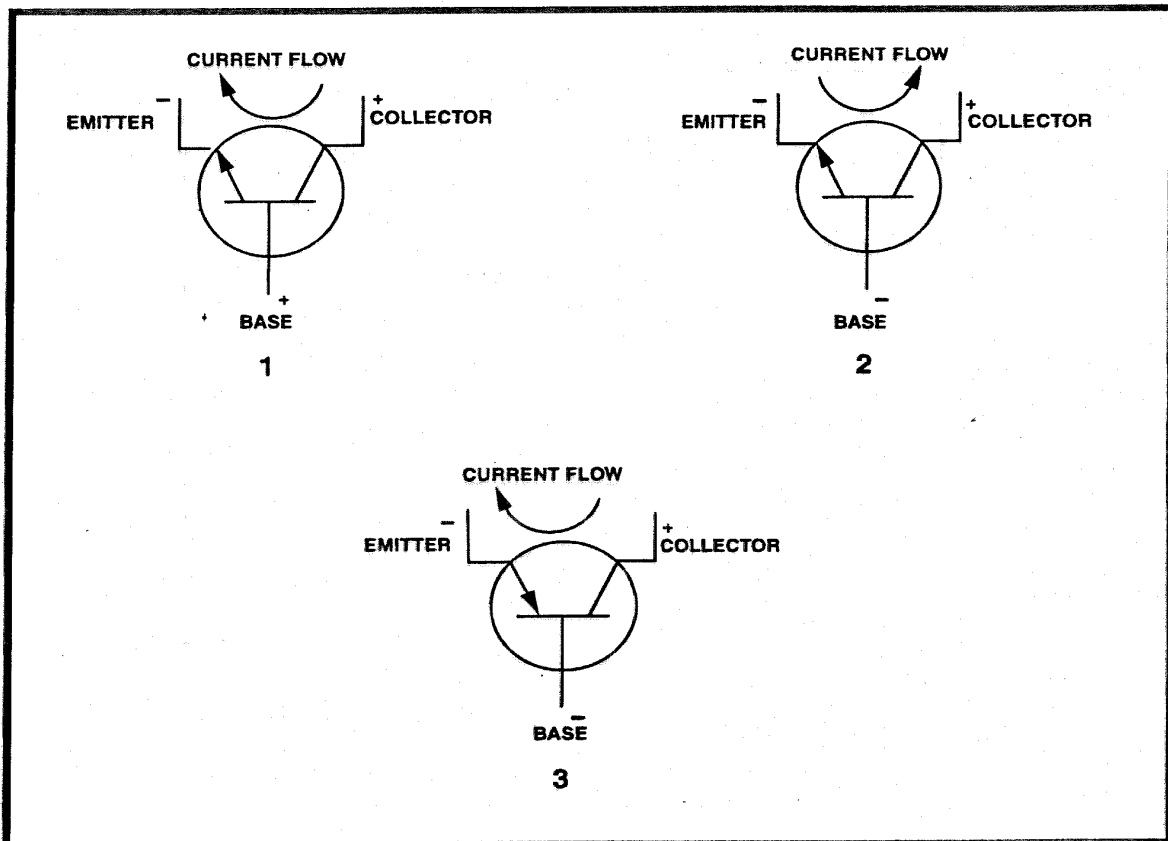


Fig. 9.13. Transistors.

85. (Refer to figure 9.14) If an open occurs at  $R_1$ , the light
- cannot be turned on.\*
  - will not be affected.
  - cannot be turned off.
86. (Refer to figure 9.14) If  $R_2$  sticks in the up position, the light will
- be on full bright.\*
  - be very dim.
  - not illuminate.
88. (Refer to figure 9.16) In a functional and operating circuit, the depicted logic gate's output will be 0
- only when all inputs are 0.
  - when all inputs are 1.
  - when one or more inputs are 0.\*

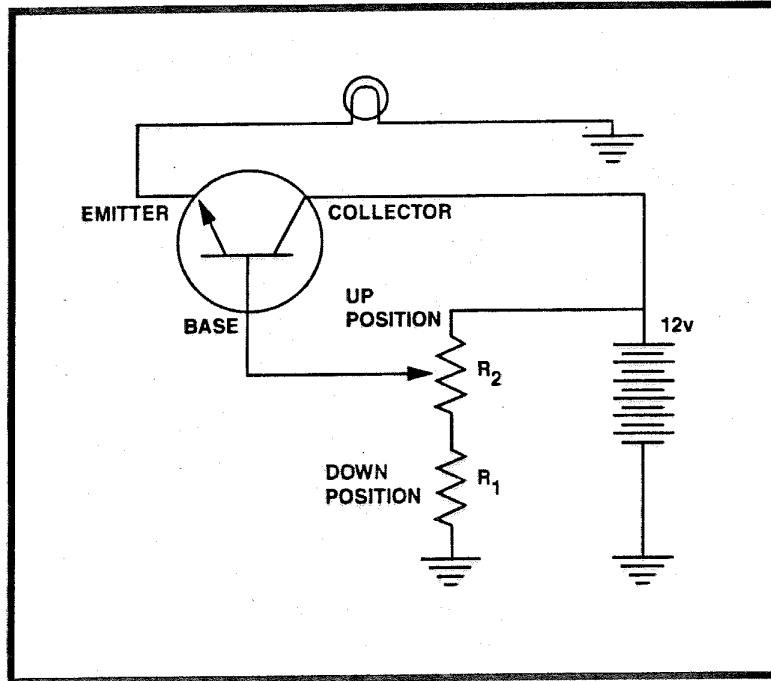


Fig. 9.14. Transistorized Circuit.

87. (Refer to figure 9.15) Which statement concerning the depicted logic gate is true ?
- Any input being 1 will produce a 0 output.
  - Any input being 1 will produce a 1 output.\*
  - All inputs must be 1 to produce a 1 output.
89. (Refer to figure 9.17) Which of the logic gate output conditions is correct with respect to the given inputs ?
- 1.
  - 2.\*
  - 3.

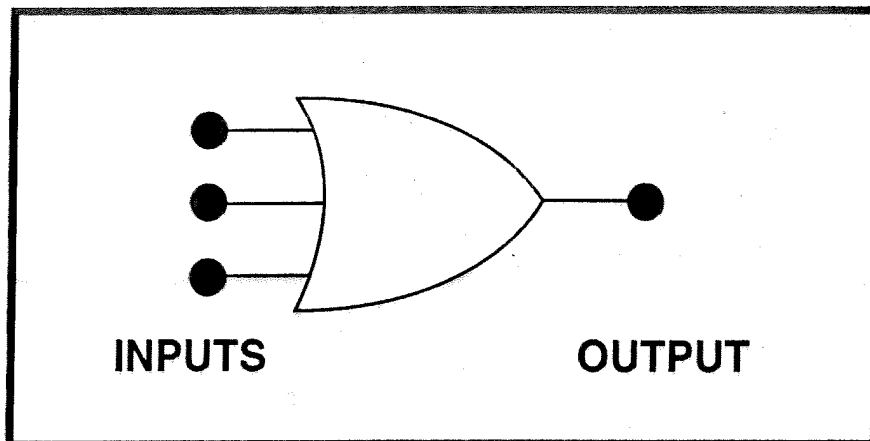


Fig. 9.15. Logic Gate.

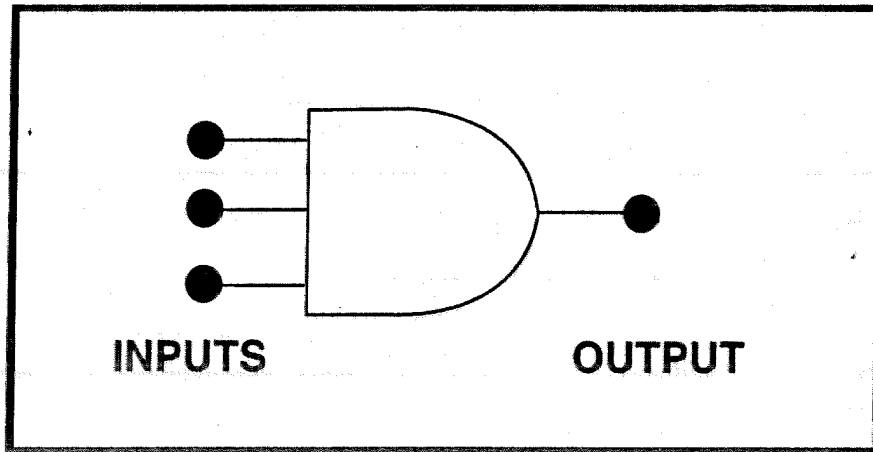


Fig. 9.16. Logic Gate.

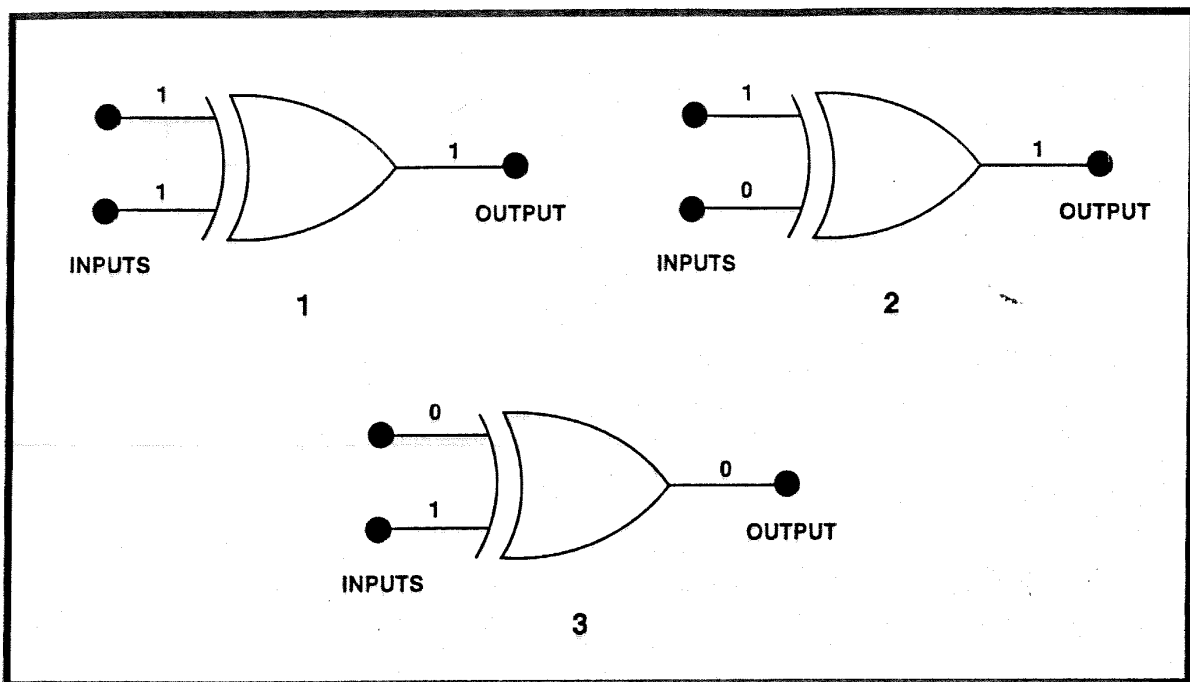


Fig. 9.17. Logic Gates.

- 90. (Refer to figure 9.18) With the landing gear retracted, the red indicator light will not come on if an open occurs in wire
  - a. number 19.\*
  - b. number 7.
  - c. number 17.
- 91. (Refer to figure 9.18) The No. 7 wire is used to
  - a. complete the PUSH-TO-TEST circuit.\*
  - b. open the UP indicator light circuit when the landing gear is retracted.
  - c. close the UP indicator light circuit when the landing gear is retracted.
- 92. (Refer to figure 9.18) When the landing gear is down, the green light will not come on if an open occurs in wire
  - a. number 7.
  - b. number 6.\*
  - c. number 17.
- 93. (Refer to figure 9.19) What will be the effect if the PCO relay fails to operate when the left-hand tank is selected?
  - a. The fuel pressure crossfeed valve will not open.
  - b. The fuel tank crossfeed valve open light will illuminate.
  - c. The fuel pressure crossfeed valve open light will not illuminate.\*
- 94. (Refer to figure 9.19) The TCO relay will operate if 24-volts dc is applied to the bus and the fuel tank selector is in the
  - a. right-hand tank position.
  - b. crossfeed position.\*
  - c. left-hand tank position.

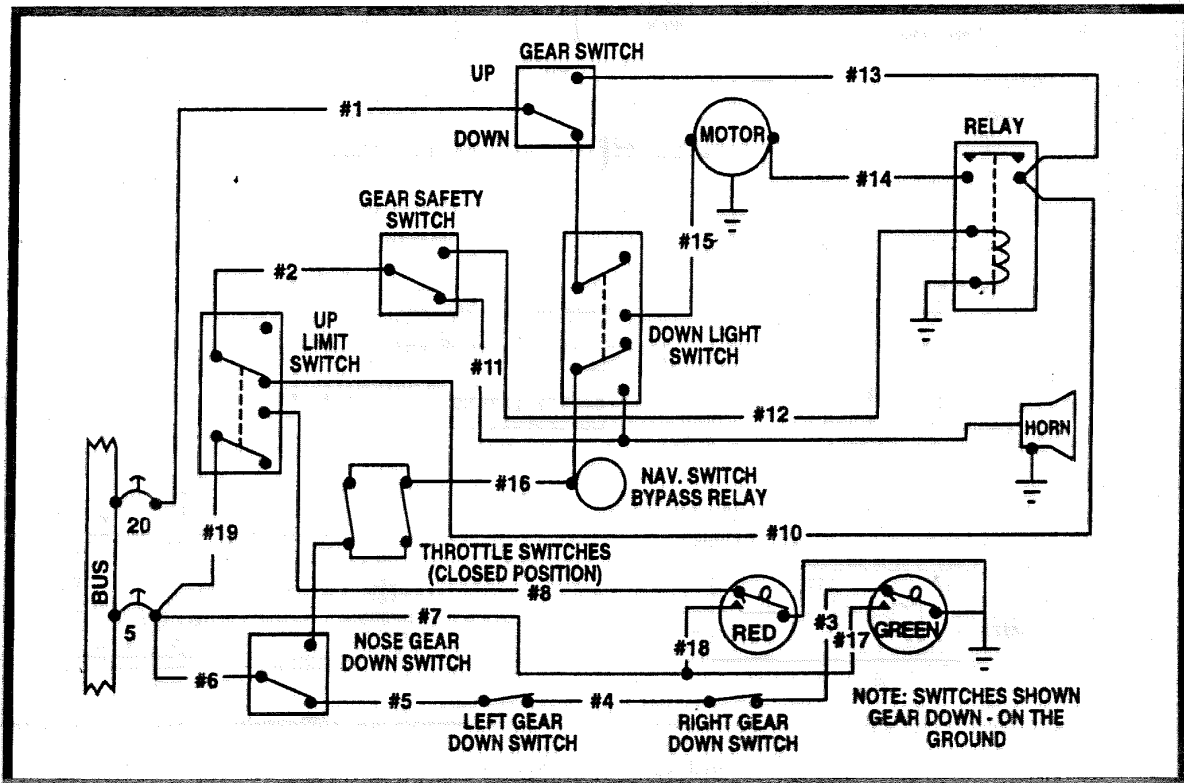


Fig. 9.18 Landing Gear Circuit.

95. (Refer to figure 9.19) With power to the bus and the fuel selector switched to the right-hand tank, how many relays in the system are operating ?
- Three.\*
  - Two.
  - Four.
96. (Refer to figure 9.19) When electrical power is applied to the bus, which relays are energized ?
- PCC and TCC.\*
  - TCC and TCO.
  - PCO and PCC.
97. (Refer to figure 9.19) Energize the circuit with the fuel tank selector switch selected to the left-hand position. Using the schematic, identify the switches that will change position.
- 5,9,10,11,12,13,15.
  - 3,5,6,7,11,13.
  - 5,6,11,12,13,15,16.\*

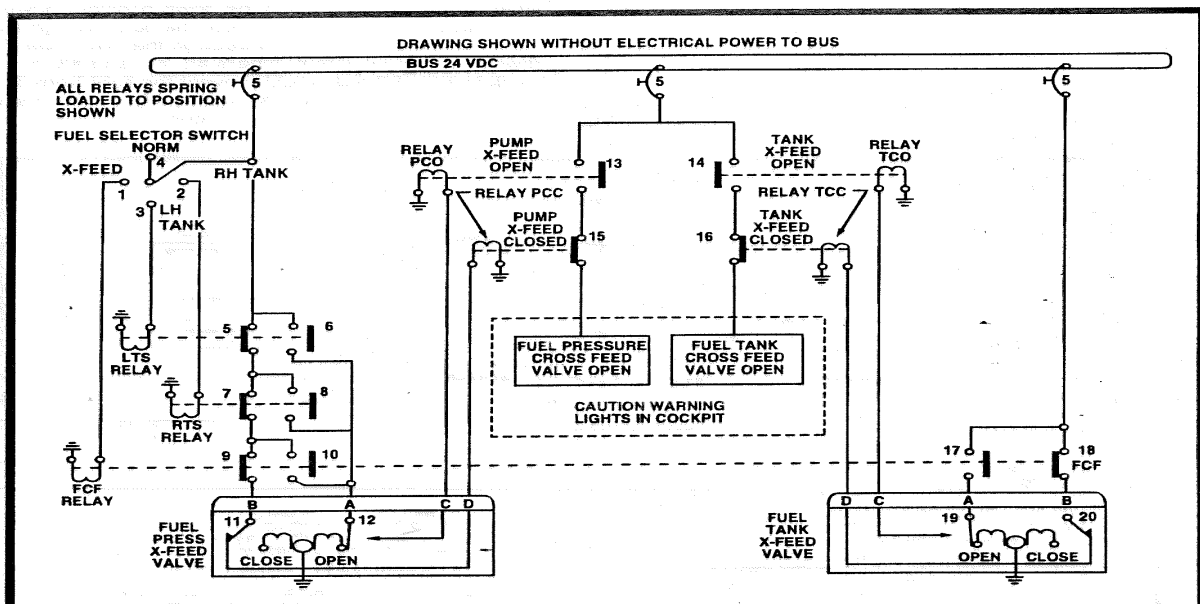


Fig. 9.19. Fuel System Circuit.

98. (Refer to figure 9.20) When the landing gears are up and the throttles are retarded, the warning horn will not sound if an open occurs in wire
- a. No. 4.\*
  - b. No. 2.
  - c. No. 9.
99. (Refer to figure 9.20) The control valve switch must be placed in the neutral position when the landing gears are down to
- a. permit the test circuit to operate.
  - b. prevent the warning horn from sounding when the throttles are closed.\*
  - c. remove the ground from the green light.
100. (Refer to figure 9.21) Under which condition will a ground be provided for the warning horn through both gear switches when the throttles are closed?
- a. Right gear up and left gear down.
  - b. Both gears up and the control valve out of neutral.
  - c. Left gear up and right gear down.\*
101. (Refer to figure 9.21) When the throttles are retarded with only the right gear down, the warning horn will not sound if an open occurs in wire
- a. No. 5.\*
  - b. No. 13.
  - c. No. 6.

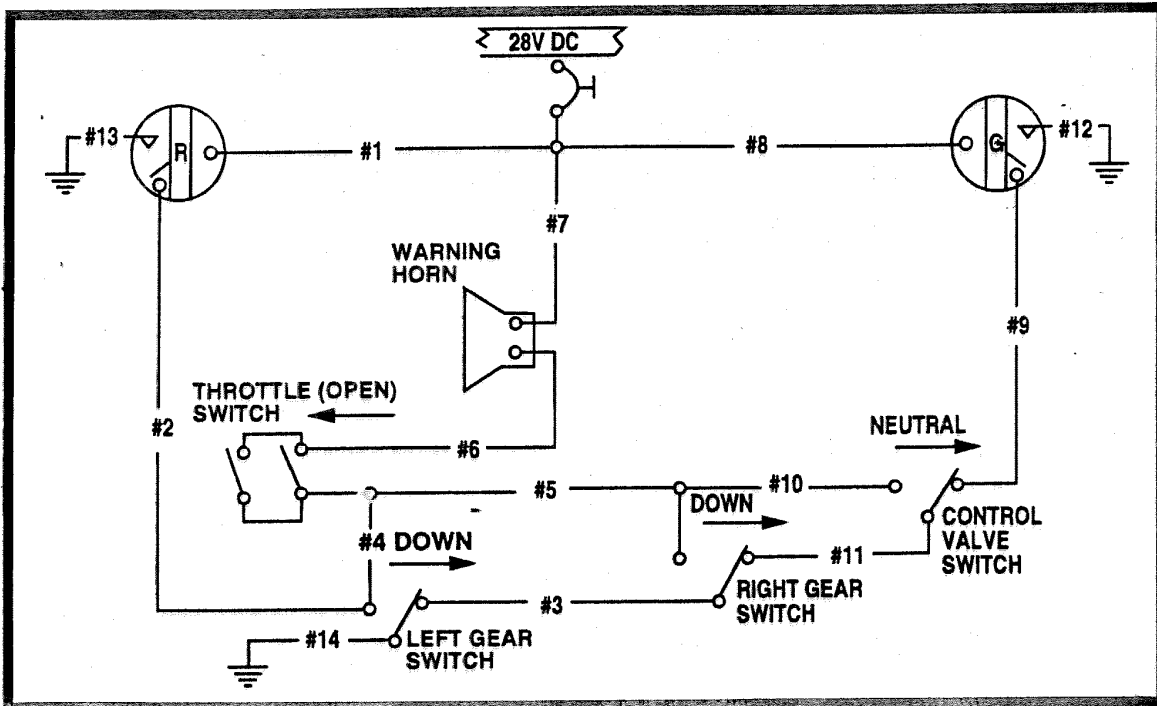


Fig. 9.20. Landing Gear

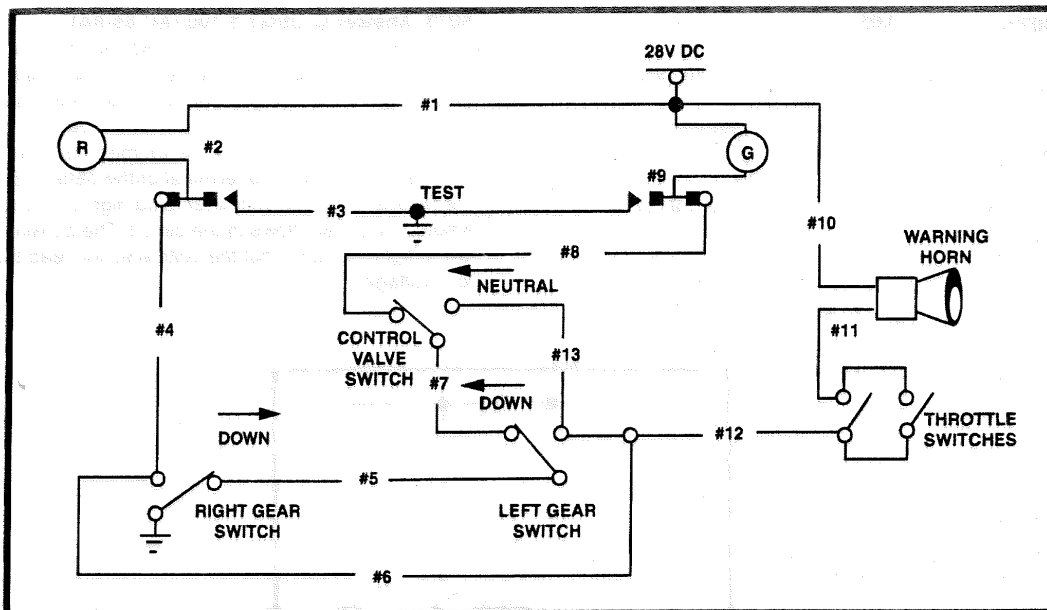


Fig. 9.21. Landing Gear Circuit.



102. (Refer to figure 9.21) When the landing gears are up and the throttles are retarded, the warning horn will not sound if an open occurs in wire
- No. 6.\*
  - No. 5.
  - No. 7.
103. When referring to an electrical circuit diagram, what point is considered to be at zero voltage ?
- The circuit breaker.
  - The fuse.
  - The ground reference.
104. (Refer to figure 9.22) Troubleshooting an open circuit with a voltmeter as shown in this circuit will
- permit current to flow and illuminate the lamp.
  - create a low resistance path and the current flow will be greater than normal.
  - permit the battery voltage to appear on the voltmeter.

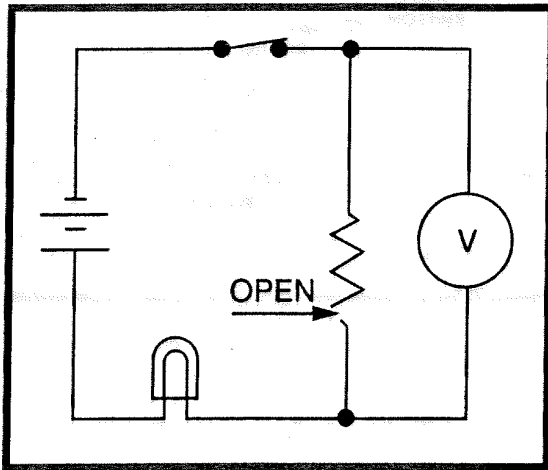


Fig. 9.22. Circuit Diagram.

### QUESTIONS AND ANSWERS

- One kilowatt is equal to how many watts ?  
Answer - 1,000 watts.
- What law describes the most fundamental or basic relationships in an electrical circuit ?  
Answer - Ohm's law.
- What are the three elements of Ohm's law ?  
Answer - Voltage, current and resistance.
- How would you write Ohm's law as an equation?  
Answer -  $E = I \times R$ ,  $R = E / I$ ,  $I = E / R$ .
- If the resistance in a DC circuit remains the same but the voltage doubles, what happens to the amount of current flowing in the circuit ?  
Answer - It also doubles.
- In DC circuits, what unit measures power ?  
Answer - Watts.
- What three elements are required to form an electrical circuit ?  
Answer - A source of electrical energy, a load or resistance to use the electricity, and wires or conductors to connect the source to the load.
- DC circuits can take one of three forms or types. What are they ?  
Answer - Series, parallel and complex (or series-parallel).
- A 24-volt lead-acid battery has how many cells ?  
Answer - Twelve.
- A fully charged lead-acid battery has a specific gravity that varies between what two values ?  
Answer - 1.275 and 1.300.
- You must apply a correction to the specific gravity reading of the electrolyte of a lead-acid battery when the temperature is outside of what two values ?  
Answer - Whenever the temperature is less than 70° F or more than 90° F.
- What is the reason for having separate facilities for storing and servicing nickel-cadmium and lead-acid batteries ?  
Answer - The electrolyte in the two types of batteries is chemically opposite and the fumes from one type can contaminate the electrolyte of the other type.
- The state of charge of a nickel-cadmium battery cannot be determined by measuring the specific gravity of the electrolyte for what reason ?  
Answer - There is no significant change in the specific gravity of the electrolyte as the battery is charged or discharged.
- What is the principal advantage of AC current over DC current ?  
Answer - Power can be transmitted over long distance more efficiently and with smaller wires because the voltage can be easily increased or decreased by a transformer.
- What are the three causes of opposition to current flow in an AC circuit ?  
Answer - Resistance, inductive reactance and capacitive reactance.
- Define inductance.  
Answer - An induced voltage which is opposite in direction to the applied voltage.
- What component creates capacitance in AC circuits ?  
Answer - A capacitor.

18. How does a capacitor store electricity?  
Answer - The energy is stored in the form of an electrostatic charge or field that exists between two conductors separated by an insulator.
19. What property of an AC circuit is defined by the term "impedance" ?  
Answer - The total opposition to current flow.
20. What are two reasons that might cause a nickel-cadmium battery to fail to deliver its rated capacity?  
Answer - Faulty cells or cell imbalance.
21. What electrical values are measured by a typical multimeter ?  
Answer - Voltage, current and resistance.
6. (1) Private aircraft are required by regulations to be weighed periodically.  
(2) Private aircraft are required to be weighed after making any alternation.  
Regarding the above statements.  
a. neither No. 1 nor No. 2 is true.\*  
b. only No. 1 is true.  
c. only No. 2 is true.
7. To obtain useful weight data for purposes of determining the CG, it is necessary that an aircraft be weighed  
a. in a level flight attitude.\*  
b. with all items of useful load installed.  
c. with at least minimum fuel (1/12-gallon per METO horsepower) in the fuel tanks.

## WEIGHT AND BALANCE

8. What type of measurement is used to designate arm in weight and balance computation ?  
a. Distance.\*  
b. Weight.  
c. Weight/distance.
9. What determines whether the value of the moment is preceded by a plus (+) or a minus (-) sign in aircraft weight and balance ?  
a. The location of the weight in reference to the datum.\*  
b. The result of a weight being added or removed and its location relative to the datum.  
c. The location of the datum in reference to the aircraft CG
10. The maximum weight of an aircraft is the  
a. empty weight plus crew, maximum fuel, cargo and baggage.  
b. empty weight plus crew, passengers and fixed equipment.  
c. empty weight plus useful load.\*
11. What should be clearly indicated on the aircraft weighing form ?  
a. Minimum allowable gross weight.  
b. Weight of unusable fuel.  
c. Weighing points.\*
12. If the reference datum line is placed at the nose of an airplane rather than at the firewall or some other location aft of the nose.  
a. all measurement arms will be in negative numbers.  
b. all measurement arms will be in positive numbers.\*  
c. measurement arms will be in both positive and negative numbers.
13. Zero fuel weight is the  
a. dry weight plus the weight of full crew, passengers and cargo.  
b. basic operating weight without crew, fuel and cargo.  
c. maximum permissible weight of a loaded aircraft (passengers, crew and cargo) without fuel.\*
1. When computing weight and balance, an airplane is considered to be in balance when  
a. the average moment arm of the loaded airplane falls within its CG range.\*  
b. all moment arms of the plane fall within CG range.  
c. the movement of the passengers will not cause the moment arms to fall outside the CG range.
2. What tasks are completed prior to weighing an aircraft to determine its empty weight ?  
a. Remove all items except those on the aircraft equipment list; drain fuel and hydraulic fluid.  
b. Remove all items on the aircraft equipment list; drain fuel, compute oil and hydraulic fluid weight.  
c. Remove all items except those on the aircraft equipment list; drain fuel and fill hydraulic reservoir.\*
3. The useful load of an aircraft consists of the  
a. crew, usable fuel, passengers and cargo.\*  
b. crew usable fuel, oil, and fixed equipment.  
c. crew, passengers, usable fuel, oil, cargo and fixed equipment.
4. Which of the following can provide the empty weight of an aircraft if the aircraft's weight and balance records becomes lost, destroyed or otherwise inaccurate ?  
a. Reweighing the aircraft.\*  
b. The applicable Aircraft Specification or Type Certificate Data Sheet.  
c. The applicable flight manual or pilot's operating handbook.
5. In the theory of weight and balance, what is the name of the distance from the fulcrum to an object ?  
a. Lever arm.\*  
b. Balance arm.  
c. Fulcrum arm.

14. The empty weight of an airplane is determined by
- adding the net weight of each weighing point and multiplying the measured distance to the datum.
  - subtracting the tare weight from the scale reading and adding the weight of each weighing point.\*
  - multiplying the measured distance from each weighing point to the datum times the sum of scale reading less the tare weight.
15. When dealing with weight and balance of an aircraft, the term "maximum weight" is interpreted to mean the maximum
- weight of the empty aircraft.
  - weight of the useful load.
  - authorized weight of the aircraft and its contents.\*
16. The useful load of an aircraft is the
- difference between the maximum gross weight and empty weight.\*
  - difference between the net weight and total weight.
  - sum of the empty weight and the maximum gross weight.
17. When determining the empty weight of an aircraft, certificated under current airworthiness standards (FAR Part 23), the oil contained in the supply tank is considered.
- a part of the empty weight.\*
  - a part of the useful load.
  - the same as the fluid contained in the water injection reservoir.
18. The maximum weight as used in weight and balance control of a given aircraft can normally be found
- by adding the weight of full fuel, pilot, passengers and maximum allowable baggage to the empty weight.
  - in the Aircraft Specification or Type Certificate Data Sheet.\*
  - by adding the empty weight and payload.
19. The amount of fuel used for computing empty weight and corresponding CG is
- empty fuel tanks.
  - unusable fuel.\*
  - the amount of fuel necessary for 1/2 hour of operation.
20. As weighed, the total empty weight of an aircraft is 5,862 pounds with a moment of 885,957. However, when the aircraft was weighed, 20 pounds of potable water were on board at +84 and 23 pounds of hydraulic fluid were in a tank located at +101. What is the empty weight CG of the aircraft ?
- 150.700.
  - 151.700.
  - 151.365.\*
21. Two boxes which weigh 10 pounds and 5 pounds are placed in an airplane so that their distance aft from the CG are 4 feet and 2 feet respectively. How far forward of the CG should a third box, weighing 20 pounds, be placed so that the CG will not be changed ?
- 3 feet.
  - 2.5 feet.\*
  - 8 feet.
22. If a 40-pound generator applies +1400 inch-pounds to a reference axis, the generator is located
- 35 from the axis.
  - +35 from the axis.\*
  - +25 from the axis.
23. In a balance computation of an aircraft from which an item located aft of the datum was removed, use
- (-) weight  $\times$  (+) arm (-) moment.\*
  - (-) weight  $\times$  (-) arm (+) moment.
  - (+) weight  $\times$  (-) arm (-) moment.
24. Datum is forward of the main gear center point 30.24 in. Actual distance between tail gear and main gear centre points 360.26 in.  
 Net weight at right main gear 9,980 lb.  
 Net weight at left main gear 9,770 lb.  
 Net weight at tail gear 1,970 lb.
- These items were in the aircraft when weighed :
- Lavatory water tank full (34 pounds at +352).
  - Hydraulic fluid (22 pounds at 8).
  - Removable ballast (146 pounds at +380).
- What is the empty weight CG of the aircraft described above ?
- 62.92 inches.
  - 60.31 inches.\*
  - 58.54 inches.
25. When an empty aircraft is weighed, the combined net weight at the main gears is 3,540 pounds with an arm of 195.5 inches. At the nose gear, the net weight is 2,322 pounds with an arm of 83.5 inches. The datum line is forward of the nose of the aircraft. What is the empty CG of the aircraft?
- 151.1.\*
  - 155.2.
  - 146.5.
26. Find the empty weight CG location for the following tricycle-gear aircraft. Each main wheel weighs 753 pounds, nosewheel weighs 22 pounds, distance between nosewheel and main wheels is 87.5 inches, nosewheel location is +9.875 inches from datum, with 1 gallon of hydraulic fluid at -21.0 inches included in the weight scale.
- +97.375 inches.
  - +95.61 inches.
  - +96.11 inches.\*

27. An aircraft with an empty weight of 2,100 pounds and an empty weight CG + 32.5 was altered as follows :
- (1) two 18 pound passenger seats located +73 were removed.
  - (2) structural modifications were made at +77 increasing weight by 17 pounds;
  - (3) a seat and safety belt weighing 25 pounds were installed at +74.5; and
  - (4) radio equipment weighing 35 pounds was installed at +95.
- What is the new empty weight CG ?
- a. +34.01.
  - b. +33.68.\*
  - c. +34.65.
28. An aircraft as loaded weighs 4,954 pounds at a CG of +30.5 inches. The CG range is +32.0 inches to +42.1 inches. Find the minimum weight of the ballast necessary to bring the CG with in the CG range. The ballast necessary to bring the CG with in the CG range. The ballast arm is + 162 inches.
- a. 61.98 pounds.
  - b. 30.58 pounds.
  - c. 57.16 pounds.\*
29. An aircraft with an empty weight of 1,800 pounds and an empty weight CG of +31.5 was altered as follows :
- (1) two 15-pound passenger seats located at +72 were removed;
  - (2) structural modifications increasing the weight 14 pounds were made at +76;
  - (3) a seat and safety belt weighing 20 pounds were installed at +73.5; and
  - (4) radio equipment weighing 30 pounds was installed at +30.
- What is the new empty weight CG ?
- a. +30.61.
  - b. +31.61.\*
  - c. +32.69.
30. An aircraft had an empty weight of 2,886 pounds with a moment of 101,673.78 before several alterations were made. The alternations included:
- (1) removing two passengers seats (15 pounds each) at +71;
  - (2) installing a cabinet (97 pounds) at +71;
  - (3) installing a seat and safety belt (20 pounds) at +71; and
  - (4) installing radio equipment (30 pounds) at +94.
- The alternations caused the new empty weight CG to move
- a. 1.62 inches aft of the original empty weight CG. \*
  - b. 2.03 inches forward of the original empty weight CG
  - c. 2.03 inches aft of the original empty weight CG.
31. When making a rearward weight and balance check to determine that the CG will not exceed the rearward limit during extreme conditions, the items of useful load which should be computed at thier minimum weights are those located forward of the
- a. forward CG limit.
  - b. datum.
  - c. rearward CG limit.\*
32. A aircraft with an empty of 1,500 pounds and an empty weight CG of +28.4 was altered as follows:
- (1) two 12-pound seats located at +68.5 were removed;
  - (2) structural modifications weighing +28 pounds were made at 73;
  - (3) a seat and safety belt weighing 30 pounds were made at +73;
  - (4) radio equipment weighing 25 pounds was installed at +85.
- What is the new empty weight CG ?
- a. +23.51.
  - b. +31.35.
  - c. 30.30.\*
33. The following alteration was performed on an aircraft: A model B engine weighing 175 pounds was replaced by a model D engine weighing 185 pounds at a -62.00-inch station. The aircraft weight and balance records show the previous empty weight to be 998 pounds and an empty weight CG of 13.48 inches. What is the new empty weight CG ?
- a. 13.96 inches.
  - b. 14.25 inches.
  - c. 12.73 inches.\*
34. If the empty weight CG of an airplane lies within the empty weight CG limits,
- a. it is necessary to calculate CG extremes.
  - b. it is not necessary to calculate CG extremes.\*
  - c. minimum fuel should be used in both forward and rearward CG checks.
35. When computing the maximum forward loaded CG of an aircraft, minimum weights, arms and moments should be used for items of useful load that are located aft of the
- a. rearward CG limit.
  - b. forward CG limit.\*
  - c. datum.
36. Which statement is true regarding helicopter weight and balance ?
- a. Regardless of internal or external loading, lateral axis CG control is ordinarily not a factor in maintaining helicopter weight and balance.
  - b. The moment of tail-mounted components is subject to constant change.
  - c. Weight and balance procedures for airplanes generally also apply to helicopters.\*
37. Improper loading of a helicopter which results in exceeding either the fore or aft CG limits is hazardous due to the
- a. reduction or loss of effective cyclic pitch control.\*
  - b. Coriolis effect being translated to the fuselage.
  - c. reduction or loss of effective collective pitch control.
38. The CG range in single-rotor helicopter is
- a. much greater than for airplanes.
  - b. approximately the same as the CG range for airplanes.
  - c. more restricted than for airplanes.\*

**QUESTIONS AND ANSWERS**

1. If an aircraft is loaded so that the aft C.G. limit is exceeded, what undesirable flight characteristic is likely to result?  
Answer - The aircraft will be tail-heavy and may be unable to recover from a stall or spin.
2. If all the records for an aircraft are missing, how would you determine the empty weight and empty weight C.G.?  
Answer - The aircraft would have to be weighed, and new weight and balance records would have to be prepared.
3. Define "tare weight" and describe how it is handled when weighing an aircraft.  
Answer - Tare weight is the weight of anything on the scales that is not part of the aircraft. It must be subtracted from the scale weight reading to determine the net weight of the airplane.
4. If a piece of equipment such as a radio is added to an aircraft, how can you determine the effect on weight and balance without re-weighing the aircraft?  
Answer - If the weight and balance records are up to date, a new weight and C.G. location can be determined by computation.
5. Why is control of the weight and balance of an aircraft important?  
Answer - To provide maximum safety.
6. What is the datum of an aircraft and what is its function?  
Answer - The datum is an imaginary vertical plane at right angles to the longitudinal axis of the airplane. It is the reference point from which all horizontal measurements are taken.
7. How do you determine the moment of an item of equipment?  
Answer - The weight of the item is multiplied by its arm, which is the distance between the item and the datum.
8. What are two ways of determining the arm of an item of equipment?  
Answer - Measure the distance between the item and the datum, or use data supplied by the manufacturer.
9. What should be done to obtain a positive (plus) moment aft of the datum?  
Answer - Add weight.
10. What should be done to obtain a negative (minus) moment aft of the datum?  
Answer - Remove weight.
11. What should be done to obtain positive (plus) moment forward of the datum?  
Answer - remove weight.
12. What should be done to obtain a negative (minus) moment forward of the datum?  
Answer - Add weight.
13. How does the category of an aircraft affect its loaded weight?  
Answer - Aircraft certificated in more than one category, such as Normal and Aerobatic, may have two different maximum gross weights and different useful loads.
14. As you prepare an aircraft for weighing, you determine that there is an equipment aboard that is not permanently installed and recorded on the equipment list. What should you do with this equipment?  
Answer - All equipment not permanently installed in the aircraft or included on the equipment list should be removed from the aircraft.
15. Define the term "residual fuel" ?  
Answer - Any fuel that remains in the tanks, lines and engines after the system has been drained.
16. Define the term "residual oil".  
Answer - Any oil that remains in the tanks, lines and engines after the system has been drained.
17. How should you account for fuel when weighing an aircraft to determine weight and balance?  
Answer - Either drain the fuel system until only unusable fuel remains or fill the tanks full and subtract out the weight of the useable fuel.
18. Where are leveling instructions found and describe one method of leveling an aircraft?  
Answer - Leveling instructions are found in the Type Certificate Data Sheets. An aircraft may be leveled by using a spirit level at specified points, or an aircraft may be leveled by using a plumbbob from a designated point along with a leveling scale or protractor.
19. Define the term "Mean Aerodynamic Chord" or MAC.  
Answer - Mean Aerodynamic Chord is the chord drawn through the center of the wing plan area.
20. Describe the two most common ways of showing the C.G. location and/or C.G. range.  
Answer - In inches from the datum or in percent of MAC.
21. What is the purpose of an aircraft loading graph?  
Answer - It is a method for determining how to distribute the load so as to keep the C.G. within allowable limits.
22. What is ballast and why would you use it in an airplane?  
Answer - Ballast is weight added to an airplane to bring its C.G. into the allowable or desired range.

23. Installation of several new radios in the nose of an aircraft causes the forward C.G. limit to be exceeded. How can you correct this problem without removing the new equipment ?  
Answer - Ballast may be installed in the tail to move the C.G. aft.
24. How does the C.G. range of a helicopter compare to that of a fixed-wing airplane ?  
Answer - Helicopter typically have a much smaller C.G. range.
7. Why is steel tempered after being hardened ?  
a. To increase its hardness and ductility.  
b. To increase its strength and decrease its internal stresses.  
c. To relieve its internal stresses and reduce its brittleness.\*
8. What aluminum alloy designations indicate that the metal has received no hardening or tempering treatment?  
a. 3003-F.\*  
b. 5052-H36.  
c. 6061-O.

## AIRCRAFT STRUCTURAL MATERIALS

1. Which of the following describe the effects of annealing steel and aluminium alloys ?  
1. decrease in internal stress.  
2. softening of the metal.  
3. improve corrosion resistance.  
a. 1, 2. \*  
b. 1, 3.  
c. 2, 3.
2. Which heat-treating process of metal produces a hard, wear-resistant surface over a strong, tough core ?  
a. Case hardening.\*  
b. Annealing.  
c. Tempering.
3. Which heat-treating operation would be performed when the surface of the metal is changed chemically by introducing a high carbide or nitride content ?  
a. Tempering.  
b. Normalizing.  
c. Case hardening.\*
4. Normalizing is a process of heat treating  
a. aluminium alloys only.  
b. iron-base metals only.\*  
c. both aluminium alloys and iron-base metals.
5. Repeatedly applying mechanical force to most metals such as rolling, hammering, bending or twisting commonly results in a condition known as:  
a. tempering or drawing.  
b. stress corrosion cracking.  
c. cold working, strain or work hardening.\*
6. The reheating of a heat treated metal, such as with a welding torch  
a. has little or no effect on a metal's heat treated characteristics.  
b. can significantly alter a metal's properties in the reheated area.\*  
c. has a cumulative enhancement effect on the original heat treatment.
9. Which material cannot be heat treated repeatedly without harmful effects ?  
a. Unclad aluminum alloy in sheet form.  
b. 6061-T9 stainless steel.  
c. Clad aluminum alloy.\*
10. What is descriptive of the annealing process of steel during and after it has been annealed ?  
a. Rapid cooling; high strength.  
b. Slow cooling; low strength.\*  
c. Slow cooling; increased resistance to wear.
11. What is generally used in the construction of aircraft engine firewalls ?  
a. Stainless steel.\*  
b. Chrome-molybdenum alloy steel.  
c. Magnesium-titanium alloy steel.
12. Alclad is a metal consisting of  
a. aluminium alloy surface layers and a pure aluminium core.  
b. pure aluminium surface layers on an aluminum alloy core.\*  
c. a homogeneous mixture of pure aluminum and aluminum alloy.
13. The Society of Automotive Engineers (SAE) and the American Iron and Steel Institute use a numerical index system to identify the composition of various steels. In the number "4130", designating chromium molybdenum steel, the first digit indicates the  
a. percentage of the basic element in the alloy.  
b. percentage of carbon in the alloy in hundredths of a percent.  
c. basic alloying element.\*
14. The core material of Alclad 2024-T4 is  
a. heat-treated aluminum alloy, and the surface material is commercially pure aluminium.\*  
b. commercially pure aluminium, and the surface material is heat-treated aluminium alloy.  
c. strain-hardened aluminum alloy, and the surface material is commercially pure aluminum.

15. The aluminum code number 1100 identifies what type of aluminum ?
  - a. Aluminum alloy containing 11 percent copper.
  - b. Aluminum alloy containing zinc.
  - c. 99 percent commercially pure aluminum.\*
16. In the four-digit aluminum index system number 2024, the first digit indicates
  - a. the major alloying element.\*
  - b. the number of different major alloying elements used in the metal.
  - c. the percent of alloying metal added.
17. Why is it considered good practice to normalize a part after welding ?
  - a. To relieve internal stresses developed within the base metal.\*
  - b. To increase the hardness of the weld.
  - c. To remove the surface scale formed during welding.
18. Parts are rinsed thoroughly in hot water after they have been heat treated in a sodium and potassium nitrate bath to
  - a. prevent corrosion.\*
  - b. prevent surface cracking.
  - c. retard discoloration.
7. Give one advantage of pre - preg(pre-impregnated) materials, other than saving time in the construction or repair of composite components.
 

Answer -

  - (1) Pre-preg fabrics contain the correct amount of matrix.
  - (2) The matrix material evenly and completely permeates the reinforcing fibers.
  - (3) The matrix has the resin and hardener in the correct proportions.

## FLUID LINES AND FITTINGS

1. Which coupling nut should be selected for use with 1/2-inch aluminum oil lines which are to be assembled using flared tube ends and standard AN nuts, sleeves and fittings ?
  - a. AN-818-5.
  - b. AN-818-16.
  - c. AN-818-8.\*
2. Metal tubing fluid lines are sized by wall thickness and
  - a. outside diameter in 1/16 inch increments.\*
  - b. inside diameter in 1/16 inch increments.
  - c. outside diameter in 1/32 inch increments.
3. From the following sequences of steps, indicate the proper order you would use to make a single flare on a piece of tubing :
  1. Place the tube in the proper size hole in the flaring block.
  2. Project the end of the tube slightly from the top of the flaring tool, about the thickness of a dime.
  3. Slip the fitting nut and sleeve on the tube.
  4. Strike the plunger several light blows with a light-weight hammer or mallet and turn the plunger one-half turn after each blow.
  5. Tighten the clamp bar securely to prevent slippage.
  6. Centre the plunger or flaring pin over the tube.
    - a. 1,3,5,2,4,6.
    - b. 3,1,6,2,5,4.\*
    - c. 3,2,6,5,1,4.
4. Hydraulic tubing, which is damaged in a localized area to such an extent that repair is necessary, may be repaired
  - a. by cutting out the damaged area and utilizing a swaged tube fitting to join the tube ends.\*
  - b. only by replacing the entire tubing using the same size and material as the original.
  - c. by cutting out the damaged section and soldering in a replacement section of tubing.
5. What is an advantage of a double flare on aluminum tubing ?
  - a. Ease of construction.
  - b. It is less resistant to the shearing effect of torque.
  - c. It is more resistant to the shearing effect of torque.\*

## QUESTIONS AND ANSWERS

1. How do you work harden a piece of metal ?
 

Answer - By cold working the metal.
2. Describe the primary difference between a thermosetting and a thermoplastic resin.
 

Answer - A thermosetting resin doesn't soften when heated and chars or burns rather than melting. Thermoplastic resins becomes soft and pliable when heated and harden when cooled.
3. Explain how thermoplastic and thermosetting resins are commonly used in modern aircraft.
 

Answer - Plexiglas is a thermoplastic resin commonly used for windshields and windows. Thermosetting resins are most often used as the matrix material in composite structures.
4. Name of the types of resin commonly used as a matrix material for aircraft composite laminates.
 

Answer - Polyester resin or Epoxy resin.
5. What are some of the materials that are commonly used as the reinforcing component in a composite structure?
 

Answer - Fiberglass, Aramid (Kevlar), Graphite (Carbon) fiber, linen and paper.
6. What are the reasons that alloy steel that is responsive to heat treatment is usually less suitable for welding ?
 

Answer - It may becomes brittle and lose its ductility in the area of the weld.

6. What is the color of an AN steel flared-tube fitting?
  - a. Black.\*
  - b. Blue.
  - c. Red.
7. Select the correct statement in reference to flare fittings.
  - a. AC fittings are generally replacing the older AN fittings.
  - b. AC and AN fittings are identical except for the material composition and identifying color.
  - c. AN fittings can easily be identified by the shoulder between the end of the threads and the flare cone.\*
8. Excessive stress on fluid or pneumatic metal tubing caused by expansion and contraction due to temperature changes can best be avoided by
  - a. using short, straight sections of tubing between fixed parts of the aircraft.
  - b. not exposing the aircraft to temperature extremes or sudden changes in temperature.
  - c. providing suitable bends in the tubing.\*
9. The material specifications for a certain aircraft require that a replacement oil line be fabricated from 3/4-inch 0.072 5052-0 aluminum alloy tubing. What is the inside dimension of this tubing ?
  - a. 0.606 inch.\*
  - b. 0.688 inch.
  - c. 0.750 inch.
10. In most aircraft hydraulic systems, two-piece tube connectors consisting of a sleeve and a nut are used when a tubing flare is required. The use of this type connector eliminates
  - a. the flaring operation prior to assembly.
  - b. the possibility of reducing the flare thickness by wiping or ironing during the tightening process.\*
  - c. wrench damage to the tubing during the tightening process.
11. Which statement about Military Standard (MS) flareless fittings is correct ?
  - a. During installation, MS flareless fittings are normally tightened by turning the nut a specified amount after the sleeve and fitting sealing surface have made contact, rather than being torqued.\*
  - b. MS flareless fittings should not be lubricated prior to assembly.
  - c. MS flareless fittings must be tightened to a specific torque.
12. When flaring aluminum tubing for use with AN fittings, the flare angle should be
  - a. 37°.\*
  - b. 35°.
  - c. 45°.
13. Scratches or nicks on the straight portion of aluminum alloy tubing may be repaired if they are no deeper than
  - a. 20 percent of the wall thickness.
  - b. 1/32 inch or 20 percent of wall thickness, whichever is less.
  - c. 10 percent of the wall thickness.\*
14. A scratch or nick in aluminum alloy tubing can be repaired by burnishing, provided the scratch or nick does not
  - a. appear in the heel of a bend in the tube.\*
  - b. exceed 20 percent of the wall thickness of the tube.
  - c. exceed 10 percent of the tube diameter.
15. Which tubings have the characteristics (high strength, abrasion resistance) necessary for use in a high-pressure (3,000 PSI) hydraulic system for operation of landing gear and flaps ?
  - a. 2024-T or 5052-0 aluminum alloy.
  - b. Corrosion-resistant steel annealed or 1/4H.\*
  - c. 1100-1/2H or 3003-1/2H aluminum alloy.
16. When installing bonded clamps to support metal tubing,
  - a. paint removal from tube is not recommended as it will inhibit corrosion.
  - b. paint clamp and tube after clamp installation to prevent corrosion.
  - c. remove paint or anodizing from tube at clamp location.\*
17. In a metal tubing installation,
  - a. rigid straight line runs are preferable.
  - b. tension is undesirable because pressurization will cause it to expand and shift.\*
  - c. a tube may be pulled in line if the nut will start on the threaded coupling.
18. A gas or fluid line marked with the letters PHDAN
  - a. is a high-pressure line. The letters mean Pressure High, Discharge at Nacelle.
  - b. is carrying a substance which may be dangerous to personnel.\*
  - c. must be made of a nonphosphorous metal.
19. (1) Bonded clamps are used for support when installation metal tubing.  
(2) Unbonded clamps are used for support when installing wiring.  
Regarding the above statements,
  - a. only No. 1 is true.
  - b. both No. 1 and No. 2 are true.\*
  - c. neither No. 1 nor No. 2 are true.
20. Which maintenance record entry best describes the action taken for a .125-inch deep dent in a straight section of 1/2-inch aluminum alloy tubing?
  - a. Dented section removed and replaced with identical new tubing flared to 45°.
  - b. Dent within acceptable limits, repair not necessary.
  - c. Dented section removed and replaced with identical new tubing flared to 37°.\*
21. A certain amount of slack must be left in a flexible hose during installation because, when under pressure, it
  - a. expands in length and diameter.
  - b. expands in length and contracts in diameter.
  - c. contracts in length and expands in diameter.\*







14. If dye penetrant inspection indications are not sharp and clear, the most probable cause is that the part
- has no appreciable damage.
  - was not correctly degaussed before the developer was applied.
  - was not thoroughly washed before the developer was applied.\*
15. (1) An aircraft part may be demagnetized by subjecting it to a magnetizing force from alternating current that is gradually reduced in strength.  
(2) An aircraft part may be demagnetized by subjecting it to a magnetizing force from direct current that is alternately reversed in direction and gradually reduced in strength.
- Regarding the above statements,
- both No. 1 and No. 2 are true.\*
  - only No. 1 is true.
  - only No. 2 is true.
16. The pattern for an inclusion is a magnetic particle buildup forming
- a fernlike pattern.
  - a single line.
  - parallel lines.\*
17. A part which is being prepared for dye penetrant inspection should be cleaned with
- a volatile petroleum-base solvent.\*
  - the penetrant developer.
  - water-base solvents only.
18. Under magnetic particle inspection, a part will be identified as having a fatigue crack under which condition?
- The discontinuity pattern is straight.
  - The discontinuity is found in a nonstressed area of the part.
  - The discontinuity is found in a highly stressed area of the part.\*
19. In performing a dye penetrant inspection, the developer
- seeps into a surface crack to indicate the presence of a defect.
  - acts as a blotter to produce a visible indication.\*
  - thoroughly cleans the surface prior to inspection.
20. What defects will be detected by magnetizing a part using continuous longitudinal magnetization with a cable?
- Defects perpendicular to the long axis of the part\*.
  - Defects parallel to the long axis of the part.
  - Defects parallel to the concentric circles of magnetic force within the part.
21. Circular magnetization of a part can be used to detect which defects?
- Defects parallel to the long axis of the part.\*
  - Defects perpendicular to the long axis of the part.
  - Defects perpendicular to the concentric circles of magnetic force within the part.
22. (1) In nondestructive testing, a discontinuity may be defined as an interruption in the normal physical structure or configuration of a part.  
(2) A discontinuity may or may not affect the usefulness of a part.
- Regarding the above statements,
- Only No. 1 is true.
  - only No. 2 is true.
  - both No. 1 and No. 2 are true.\*
23. (Refer to figure 9.23) Identify the weld caused by an excessive amount of acetylene.
- 4.
  - 1.
  - 3.\*
24. (Refer to figure 9.23) Select the illustration which depicts a cold weld.
- 3.
  - 2.\*
  - 4.
25. Holes and a few projecting globules are found in a weld. What action should be taken?
- Thoroughly clean the area and reweld over the first bead to fill gaps and obtain uniform strength.
  - Remove all the old weld and reweld the joint.\*
  - Grind the rough surface smooth and reweld the joint.
26. Which condition indicates a part has cooled too quickly after being welded?
- Cracking adjacent to the weld.\*
  - Discoloration of the base metal.
  - Gas pockets, porosity and slag inclusions.
27. Select a characteristic of a good gas weld.
- The depth of penetration shall be sufficient to ensure fusion of the filler rod.
  - The height of the weld bead should be 1/8 inch above the base metal.
  - The weld should taper off smoothly into the base metal.\*
28. One characteristic of a good weld is that no oxide should be formed on the base metal at a distance from the weld of more than
- 1/2 inch.\*
  - 1 inch.
  - 1/4 inch.
29. (Refer to figure 9.24) What type of weld is shown at A?
- Fillet.
  - Butt.\*
  - Lap.
30. (Refer to figure 9.24) What type of weld is shown at B?
- Butt.
  - Double butt.\*
  - Fillet.

31. (Refer to figure 9.24) What type of weld is shown at G ?  
 a. Lap.\*                                      b. Butt.  
 c. Joint.

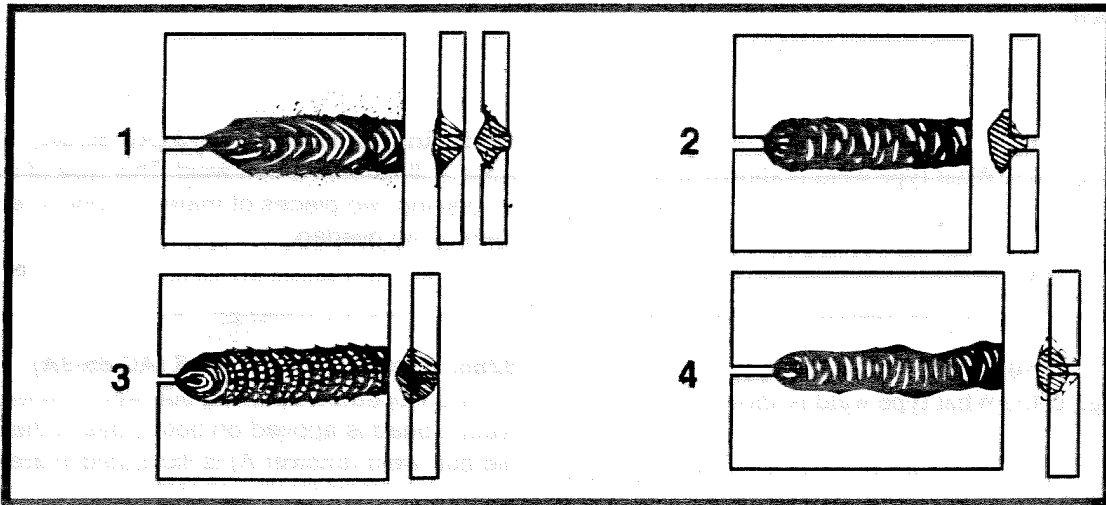


Fig. 9.23. Welds.

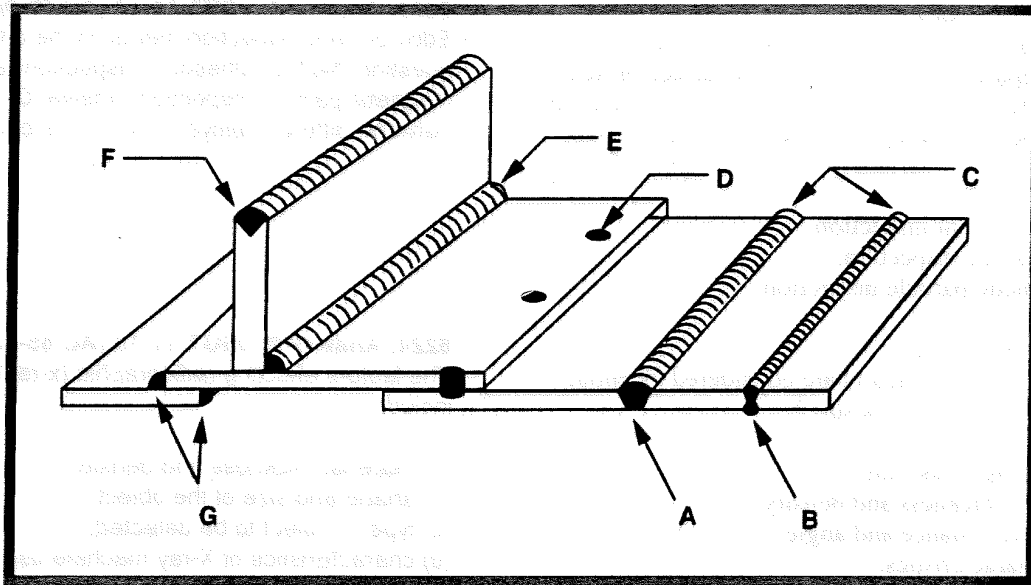


Fig. 9.24. Welds.

32. On a fillet weld, the penetration requirement includes what percentage(s) of the base metal thickness ?  
 a. 100 percent.  
 b. 25 to 50 percent.\*  
 c. 60 to 80 percent.
33. Which of these nondestructive testing methods is suitable for the inspection of most metals, plastics and ceramics for surface and subsurface defects?  
 a. Eddy current inspection.  
 b. Magnetic particle inspection.  
 c. Ultrasonic inspection.\*
34. What nondestructive testing method requires little or no part preparation, is used to detect surface or near surface defects in most metals, and may also be used to separate metals or alloys and their heat-treat conditions ?  
 a. Eddy current inspection.\*  
 b. Ultrasonic inspection.  
 c. Magnetic particle inspection.

35. How many of these factors are considered essential knowledge for x-ray exposure ?
1. Processing of the film.
  2. Material thickness and density.
  3. Exposure distance and angle.
  4. Film characteristics.
- a. One.
  - b. Three.\*
  - c. Four.
36. A mechanic has completed a bonded honeycomb repair using the potted compound repair technique. What nondestructive testing method is used to determine the soundness of the repair after the repair has cured ?
- a. Eddy current test.
  - b. Metallic ring test.\*
  - c. Ultrasonic test.
8. Describe the basic steps for conducting a magnetic particle inspections.
- Answer - Magnetize the part, then coat the surface with ferromagnetic particles. If a defect or discontinuity is present, the particles align with the discontinuity forming a visible pattern.

## CLEANING AND CORROSION

### QUESTIONS AND ANSWERS

1. Describe the steps involved in a dye penetrant inspection.  
Answer - The surface is cleaned and then penetrant is applied and allowed to dwell for a specified time. The penetrant is then removed with an emulsifier or cleaner. Once removed, the part is dried and then developer is applied. The results are then inspected and interpreted.
2. Name some tools that are commonly used to assist in making visual inspections of welds.  
Answer - A magnifying glass, flashlight, mirror and possibly a boroscope.
3. What are some of the non-destructive testing methods that may be used on aluminum parts ?  
Answer - visual, dye penetrant, eddy current, ultrasonic testing and radiography.
4. What process occurs during the preparation stage of a dye penetrant inspection when the penetrating liquid is applied, and then removed from a cracked part ?  
Answer - The penetrant enters the crack by capillary action and remains there until made visible by the developer.
5. A correctly made butt weld will have what bead width and how much penetration ?  
Answer - The bead width should be 3 to 5 times the thickness of the base metal visible by the developer.
6. What telltale characteristics are evidence of a cold weld?  
Answer - A cold weld has rough, irregular edges that are not feathered into the base metal and has variations in penetration amounts.
7. The penetration of a fillet weld should be what percentage of the thickness of the base metal ?  
Answer - 25 to 50 percent.
1. A primary reason why ordinary or otherwise nonapproved cleaning compounds should not be used when washing aircraft is because their use can result in
  - a. hydrogen embrittlement in metal structures.\*
  - b. hydrogen embrittlement in nonmetallic materials.
  - c. a general inability to remove compound residues.
2. How many magnesium engine parts be cleaned ?
  - a. Soak in a 20 percent caustic soda solution.
  - b. Spray with MEK (methyl ethyl Ketone).
  - c. Wash with a commercial solvent, decarbonize and scrape or grit blast.\*
3. Select the solvent recommended for wipedown of cleaned surfaces just before painting ?
  - a. Aliphatic naphtha.\*
  - b. Dry-cleaning solvent.
  - c. Aromatic naphtha.
4. What is used for general cleaning of aluminum surfaces by mechanical means ?
  - a. Carborundum paper.
  - b. Aluminum wool.\*
  - c. Crocus cloth.
5. Select the solvent used to clean acrylics and rubber.
  - a. Aliphatic naphtha.\*
  - b. Methyl ethyl ketone.
  - c. Aromatic naphtha.
6. Fayed surfaces cause concern in chemical cleaning because of the danger of
  - a. forming passive oxides.
  - b. entrapping corrosive materials.\*
  - c. corrosion by imbedded iron oxide.
7. Caustic cleaning products used on aluminum structures have the effect of producing
  - a. passive oxidation.
  - b. improved corrosion resistance.
  - c. corrosion.\*
8. Why is a plastic surface flushed with fresh water before it is cleaned with soap and water ?
  - a. To prevent crazing.
  - b. To prevent scratching.\*
  - c. To prevent discoloration and embrittlement.

9. What should be done to prevent rapid deterioration when oil or grease come in contact with a tire ?
  - a. Wipe the tire thoroughly with a dry cloth, and then rinse with clean water.
  - b. Wipe the tire with a dry cloth followed by a wash down and rinse with soap and water.\*
  - c. Wipe the tire with a cloth damped with aeromatic naphtha and then wipe dry with a clean cloth.
10. What type of corrosion attacks grain boundaries of aluminum alloy which are improperly or inadequately heat treated ?
  - a. Filiform.
  - b. Intergranular.\*
  - c. Fretting.
11. Fretting corrosion is most likely to occur
  - a. When two surfaces fit tightly together but can move relative to one another.\*
  - b. only when two dissimilar metals are in contact
  - c. when two surfaces fit loosely together and can move relative to one another.
12. The rust or corrosion that occurs with most metals is the result of
  - a. a tendency for them to return to their natural state\*.
  - b. blocking the flow of electrons in homogenous metals, or between dissimilar metals
  - c. electron flow in or between metals from cathodic to anodic areas.
13. Which of the listed conditions is NOT one of the requirements for corrosion to occur ?
  - a. The presence of an electrolyte.
  - b. Electrical contact between an anodic area and cathodic area.
  - c. The presence of a passive oxide film.\*
14. The lifting or flaking of the metal at the surface due to delamination of grain boundaries caused by the pressure of corrosion residual product buildup is called
  - a. brinelling.
  - b. granulation.
  - c. exfoliation.\*
15. Intergranular corrosion in aluminum alloy parts
  - a. may be detected by surface pitting, and white powdery deposit formed on the surface of the metal.
  - b. commonly appears as threadlike filaments of corrosion products under a dense film of paint.
  - c. cannot always be detected by surface indications\*.
16. A primary cause of intergranular corrosion is
  - a. improper heat treatment.\*
  - b. dissimilar metal contact.
  - c. improper application of primer.
17. Which of these materials is the most anodic ?
  - a. Cadmium.
  - b. 7075-T6 aluminum alloy.\*
  - c. Magnesium.
18. Corrosion caused by galvanic action is the result of
  - a. excessive anodization
  - b. contact between two unlike metals
  - c. excessive etching \*
19. Which of these materials is the most cathode ?
  - a. Zinc.
  - b. 2024 aluminum alloy.
  - c. Stainless steel.\*
20. Galvanic corrosion is likely to be most rapid and severe when
  - a. the surface area of the cathodic metal is smaller than surface area of the anodic metal.
  - b. the surfaces areas of the anodic and cathodic metals are approximately the same.
  - c. the surfaces area of the anodic metal is smaller than the surface area of the cathodic metal.\*
21. One way of obtaining increased resistance to stress corrosion cracking is by
  - a. relieving compressive stresses on the metal surface.
  - b. creating compressive stresses on the metal surface\*.
  - c. producing nonuniform deformation while cold working during the manufacturing process.
22. (1) In the corrosion process, it is the cathodic area or dissimilar cathodic material that corrodes.  
(2) In the Galvanic or Electro-Chemical Series for metals, the most anodic metals are those that will give up electrons most easily.  
Regarding the above statements,
  - a. only No. 1 is true.
  - b. only No. 2 is true.\*
  - c. both No. 1 and No. 2 are true.
23. Spilled mercury on aluminum
  - a. increases susceptibility to hydrogen embrittlement.
  - b. may cause impaired corrosion resistance if left in prolonged contact.
  - c. causes rapid and severe corrosion that is very difficult to control.\*
24. When an anodized surface coating is damaged in service, it can be partially restored by
  - a. use of a metal polish.
  - b. chemical surface treatment.\*
  - c. a suitable mild cleaner.
25. Which of the following are the desired effects of using Alodine on aluminum alloy ?
  1. A slightly rough surface.
  2. Relieved surface stresses.
  3. A smooth painting surface.
  4. Increased corrosion resistance.
  - a. 3 and 4.
  - b. 1, 2 and 4.
  - c. 1 and 4.\*

26. A nonelectrolytic chemical treatment for aluminum alloys to increase corrosion resistance and paint-bonding qualities is called
- anodizing.
  - alodizing.\*
  - dichromating.
27. What may be used to remove corrosion from highly stressed steel surfaces ?
- Steel wire brushes.
  - Fine-grit aluminum oxide.\*
  - Medium-grit carborundum paper.
28. Corrosion should be removed from magnesium parts with a
- silicon carbide brush.
  - carborundum abrasive.
  - stiff, hog-bristle brush.\*
29. Why is it important not to rotate the crankshaft after the corrosion preventive mixture has been put into the cylinders on engines prepared for storage ?
- Fuel may be drawn into one or more cylinders and dilute or wash off the corrosion preventive mixture.
  - The seal of corrosion preventive mixture will be broken.\*
  - The link rods may be damaged by hydraulic lock.
30. Galvanic action caused by dissimilar metal contact may best be prevented by
- placing nonporous dielectric material between the surfaces.\*
  - cleaning both surfaces with a non-residual solvent.
  - application of paper tape between the surfaces.
31. The interior surface of sealed structural steel tubing would be best protected against corrosion by which of the following ?
- Charging the tubing with dry nitrogen prior to sealing.
  - evacuating the tubing before sealing.
  - a coating of hot linseed oil.\*
4. What materials are commonly used as heavy duty cleaners ?  
Answer - Solvents and emulsions.
5. What are the preferred cleaners for plastic surfaces such as windshields ?  
Answer - Mild soap and water or a manufacture approved cleaner.
6. What type of cleaning agents should be used to remove grease, oil or fuel from aircraft tires ?  
Answer - Soap and water.
7. Give at least three examples of the factors that cause or influence corrosion.  
Answer -  
(1) The environmental conditions.  
(2) The presence of dissimilar metals.  
(3) The type of metal.  
(4) The condition of protective coatings.
8. Name at least three forms of corrosion.  
Answer -  
(1) Surface.  
(2) Intergranular  
(3) Filiform.  
(4) Dissimilar metal (or galvanic).  
(5) Oxidation.  
(6) Pitting.  
(7) Stress.  
(8) Fretting.
9. name at least one cause of filiform corrosion.  
Answer -  
(1) Improper or incomplete curing of a wash primer prior to painting.  
(2) Failure to completely wash off acidic surface contamination.
10. What are the visible signs of filiform corrosion?  
Answer - Blistered paint surface or worm or thread-like tracks or patterns under the paint.

### QUESTIONS AND ANSWERS

1. Is there any requirement for cleaning an aircraft prior to an annual or 100 hour inspection ?  
Answer - It is not only good, common sense, but it is a legal requirement as specified in FAR Part 43, Appendix D.
2. Discuss the general precautions that should be observed when washing an airplane.  
Answer - Avoid or protect areas, which may be damaged or contaminated. Such as : Pitot and static ports, hinges, sealed areas and bearings.
3. What are some of the more common light-duty cleaning agents ?  
Answer - Soap or detergents and water.
11. What are the two primary factors that may cause development of stress corrosion cracks ?  
Answer - A corrosive environment and sustained tensile stress.
12. What are the visible signs of fretting corrosion ?  
Answer - The corrosion residue has a dark, smoky appearance and often appears around and streaming back from rivet heads.
13. Why are piano-type hinges are prime spots for corrosion ?  
Answer - The steel pin and aluminum hinge material are dissimilar metals and the hinge design tends to trap moisture and contaminants.

14. What is the best way to protect piano hinges from corrosion ?

Answer - Keep them clean and properly lubricated.

15. Provide at least four examples of procedures used to prevent corrosion.

Answer -

- (1) Cleaner.
- (2) Lubrication.
- (3) Treatment.
- (4) Sealing.
- (5) Inspection.
- (6) Installing protective covers.
- (7) Keeping drain holes free and clear.

16. Describe the tools that should be used to remove corrosion from anodized aluminum surfaces.

Answer - Nylon scrubber pads such as "Scotch-Brite", bristle brushes, aluminum wool or aluminum wire brushes.

17. Describe the effects of using steel brushes or steel wool to remove corrosion from aluminum surfaces.

Answer - Steel brushes or steel wool must not be used to clean aluminum because steel particles can become embedded in the aluminum and cause corrosion.

18. What is the purpose of Alodine ?

Answer - Alodine is a chemical process that deposits a protective film on aluminum alloys. This film improves corrosion resistance and paint adhesion.

19. For what reason should you avoid cleaning anodized aluminum surfaces with aluminum metal polish ?

Answer - The metal polish remove the protective oxide coating.

20. Why should aircraft fabrics and plastics be cleaned only with recommended cleaners ?

Answer - recommended cleaners cause the least amount of deterioration or damage.

21. List at least five examples of areas in an aircraft that are prone to corrosion.

Answer -

- (1) Battery compartments.
- (2) Exhaust trail areas.
- (3) Bilge areas.
- (4) Vent areas.
- (5) Landing gear and wheel wells.
- (6) Fuel tanks.
- (7) Wing flap recesses.
- (8) Around and below galleys and lavatories.
- (9) Piano Hinges.
- (10) Any area that can trap water.

## GROUND HANDLING AND SERVICING

1. During starting of a turbine powerplant using a compressed air starter, a hung start occurred. Select the proper procedure.
  - a. Shut the engine down.\*
  - b. Re-engage the starter.
  - c. Advance power level to increase RPM.
2. A hung start in a jet engine is often caused by
  - a. malfunctions in the ignition system.
  - b. the starter cutting off too soon.\*
  - c. an excessively rich fuel/air mixture.
3. Which statement below reflects a typical requirement when towing some aircraft ?
  - a. Discharge all hydraulic pressure to prevent accidental operation of the nosewheel steering mechanism.
  - b. tailwheel aircraft must be towed backwards.
  - c. If the aircraft has a steerable nosewheel, the torque-link lock should be set to full swivel.\*
4. Which statement(s) is/are true regarding tiedown of small aircraft ?
  1. Manila (hemp) rope has a tendency to stretch when it gets wet.
  2. Nylon or dacron rope is preferred to manila rope.
  3. The aircraft should be headed downwind in order to eliminate or minimize wing lift.
  4. Leave the nosewheel or tailwheel unlocked.
    - a. 1, 2, 3 and 4.
    - b. 1 and 2.
    - c. 2.\*
5. When approaching the front of an idling jet engine, the hazard area extends forward of the engine approximately
  - a. 10 feet.
  - b. 15 feet.
  - c. 25 feet.\*
6. Which of the following is the most satisfactory extinguishing agent for use on a carburetor or intake fire ?
  - a. Dry chemical.
  - b. A fine, water mist.
  - c. Carbon dioxide.\*
7. (Refer to fig. 9.25) identify the signal to engage rotor on a rotorcraft
  - a. 1.
  - b. 3.\*
  - c. 2.
8. If a radial engine has been shut down for more than 30 minutes, the propeller should be rotated through at least two revolutions to
  - a. check for hydraulic lock.\*
  - b. check for leaks.
  - c. prime the engine.



9. The priming of a fuel injected horizontally opposed engine is accomplished by placing the fuel control lever in the
- IDLE-CUTOFF position.
  - AUTO-RICH position.
  - FULL-RICH position.\*
12. (Refer to figure 9.26) Which marshalling signal should be given if a taxiing aircraft is in danger of striking an object ?
- 1.
  - 2.
  - 3.\*

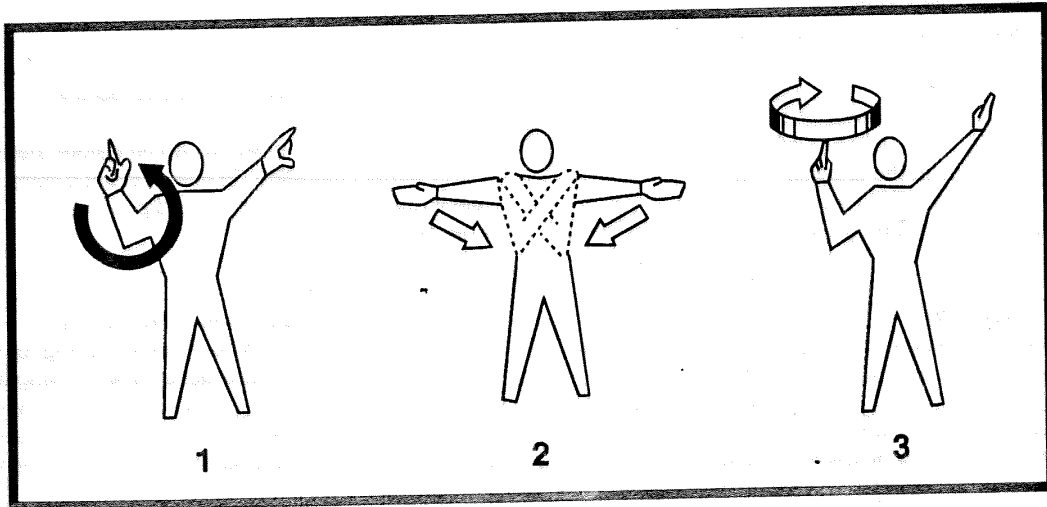


Fig. 9.25. Marshalling Signals.

10. The most important condition to be monitored during start after fuel flow begins in a turbine engine is the
- EGT, TIT or ITT.\*
  - RPM.
  - oil pressure.
11. How is a flooded engine, equipped with a float-type carburetor, cleared of excessive fuel ?
- Crank the engine with the starter or by hand, with the mixture control in cutoff, ignition switch off, and the throttle fully open, until the fuel charge has been cleared.\*
  - Turn off the fuel and the ignition. Discontinue the starting attempt until the excess fuel has cleared.
  - Crank the engine with the starter or by hand, with the mixture control in cutoff, ignition switch on, and the throttle fully open, until the excess fuel has cleared or until the excess fuel has cleared or until the engine starts.
13. Generally, when an induction fire occurs during starting of a reciprocating engine, the first course of action should be to
- direct carbon dioxide into the air intake of the engine.
  - continue cranking and start the engine if possible\*.
  - close the throttle.
14. When starting and ground operating an aircraft's engine, the aircraft should be positioned to head into the wind primarily
- to aid in achieving and maintaining the proper air and fuel mixture flow in the engine.
  - for engine cooling purposes.\*
  - to help cancel out engine torque effect.

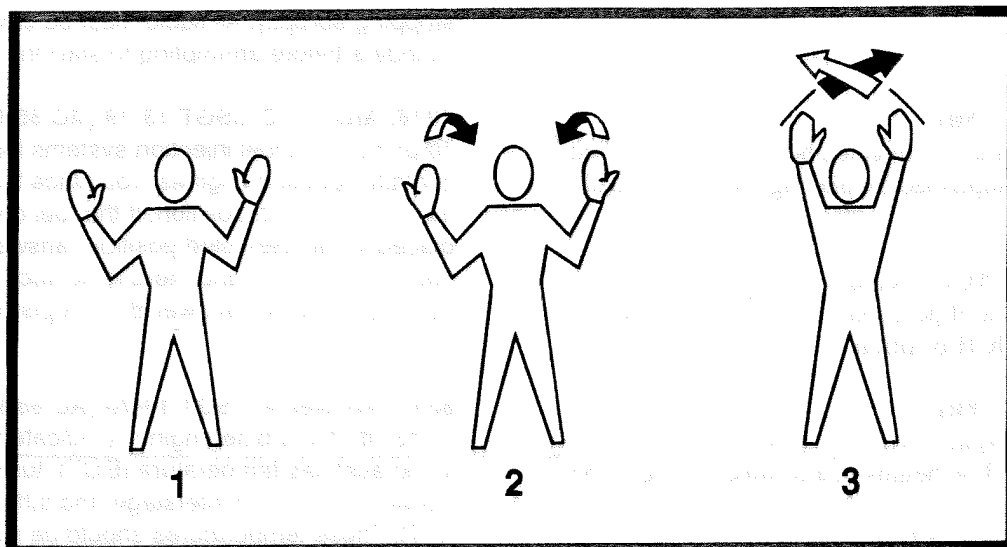


fig. 9.26. Marshalling Signals.

15. When approaching the rear of an idling turbojet engine, the hazard area extends aft of the engine approximately
  - a. 200 feet.
  - b. 100 feet.\*
  - c. 50 feet.
16. During starting of a turbojet powerplant using a compressed air starter, a hot start occurrence was recorded. Select what happened from the following.
  - a. The pneumatic starting unit overheated.
  - b. The powerplant was preheated before starting.
  - c. The fuel/air mixture was excessively rich.\*
17. During towing operations
  - a. a person should be in the cockpit to watch for obstructions.
  - b. persons should be stationed at the nose, and
  - c. a qualified person should be in the cockpit to operate brakes.\*
18. The tendency of tailwheel-type airplanes to weathervane is greatest while taxiing with a
  - a. direct crosswind.\*
  - b. quartering headwind.
  - c. tailwind.
19. A tailwheel-type airplane has a greater tendency to weathervane during taxi than a nosewheel-type because on a tailwheel airplane, the
  - a. vertical stabilizer to fuselage proportion is greater.
  - b. surface area ratio behind the pivot point (main gear) is greater.\*
  - c. surface area ratio behind the pivot point (main gear) is less.
20. When taxiing (or towing) an aircraft, a flashing red light from the control tower means
  - a. stop and wait for a green light.
  - b. move clear of the runway / taxiway immediately.\*
  - c. return to starting point.
21. A person should approach or leave a helicopter in the pilot's field of vision whenever the engine is running in order to avoid
  - a. the tail rotor.\*
  - b. the main rotor.
  - c. blowing dust or debris caused by rotor downwash.
22. When taxiing (or towing) an aircraft, a flashing white light from the control tower means
  - a. move clear of the runway / taxiway immediately.
  - b. OK to proceed but use extreme caution.
  - c. return to starting point.\*
23. When taxiing (or towing) an aircraft, an alternating red and green light from the control tower means
  - a. move clear of the runway / taxiway immediately.
  - b. OK to proceed but use extreme caution.\*
  - c. return to starting point.
24. When parking a nosewheel-type airplane after taxiing (or towing) the nosewheel should be left
  - a. unlocked.
  - b. turned at a small angle.
  - c. pointed straight ahead.\*
25. When first starting to move an aircraft while taxiing, it is important to
  - a. test the brakes.\*
  - b. closely monitor the instruments.
  - c. notify the control tower.
26. What effect will aviation gasoline mixed with jet fuel have on turbine powerplant efficiency ?
  - a. No appreciable effect.
  - b. The tetraethyl lead in the gasoline forms deposits on the turbine blades.\*
  - c. The tetraethyl lead in the gasoline forms deposits on the compressor blades.
27. (1) Jet fuel is of higher viscosity than aviation gasoline and therefore holds contaminants better.  
(2) Viscosity has no relation to contamination of fuel. Regarding the above statements,
  - a. only No. 1 is true.\*
  - b. both No. 1 and No. 2 are true.
  - c. neither No.1 nor No. 2 is true.
28. The color of 100LL fuel is
  - a. blue.\*
  - b. colorless or straw.
  - c. red.
29. How are aviation fuels, which possess greater antiknock qualities than 100 octane, classified ?
  - a. According to the milliliters of lead.
  - b. By reference numbers.
  - c. By performance numbers.\*
30. Why is ethylene dibromide added to aviation gasoline?
  - a. To remove zinc silicate deposits from the spark plugs.
  - b. To scavenge lead oxide from the cylinder combustion chambers.\*
  - c. To increase the anti-knock rating of the fuel.
31. Both gasoline and kerosene have certain advantages for use as turbine fuel. Which statement is true in reference to the advantages of each ?
  - a. Kerosene has a higher heat energy per unit weight than gasoline.
  - b. Gasoline has a higher heat energy per unit volume than kerosene.
  - c. Kerosene has a higher heat energy per unit volume than gasoline.\*
32. What must accompany fuel vaporization ?
  - a. An absorption of heat.\*
  - b. A decrease in vapour pressure.
  - c. A reduction in volume.

33. Characteristics of detonation are
- cylinder pressure remains the same, excessive cylinder head temperature and a decrease in engine power.
  - rapid rise in cylinder pressure, excessive cylinder head temperature, and a decrease in engine power\*.
  - rapid rise in cylinder pressure, cylinder head temperature normal, and a decrease in engine power.
34. A fuel that vaporizes too readily may cause
- hard starting.
  - detonation.
  - vapour lock.\*
35. Jet fuel number identifiers are
- performance numbers to designate the volatility of the fuel.
  - performance numbers and are relative to the fuel's performance in the aircraft engine.
  - type numbers and have no relation to the fuel's performance in the aircraft engine.\*
36. The main differences between grades 100 and 100LL fuel are
- volatility and lead content.
  - volatility, lead content, and color.
  - lead content and color.\*
37. Characteristics of aviation gasoline are
- high heat value, high volatility.\*
  - high heat value, low volatility.
  - low heat value, low volatility.
38. Tetraethyl lead is added to aviation gasoline to
- retard the formation of corrosives.
  - improve the gasoline's performance in the engine\*.
  - dissolve the moisture in the gasoline.
39. A fuel that does not vaporize readily enough can cause
- vapor lock.
  - detonation.
  - hard starting.\*
2. What is the most generally used knot for tying down small aircraft ?  
Answer - The bowline (although other anti-slip knots may be used).
3. Describes the precautions that should be taken to protect life and property while starting and running an aircraft engine.  
Answer - Study the procedures in the Airplane Flight Manual. Be sure the propeller or inlet area is clear and check for loose stones, gravel, etc. that could be sucked into the prop or engine. Also ensure that the prop or jet blast doesn't blow into hangars or other airplanes, and have a fire guard nearby.
4. If an engine induction fire occurs while starting a reciprocating engine, what procedure should be followed to extinguish the fire ?  
Answer - Continue cranking the engine to start it and suck the fire into the engine. If the engine doesn't start and the fire continues to burn, discontinue the start attempt and extinguish the fire with a suitable fire extinguisher.
5. What safety procedures must be observed when hand-propping a small aircraft engine ?  
Answer - Become thoroughly trained. Have a qualified person in the cockpit, check the brakes, call "SWITCH OFF" before moving the prop and make sure you have solid footing. When ready to start, call 'CONTACT' and listen for the reply. Swing the prop with the flat of your hand and move back from the prop arc.
6. What procedure should be followed prior to starting a large radial engine to detect and/or prevent a hydraulic lock in the cylinders ?  
Answer - Pull the propeller through by hand for three or four complete revolutions. Resistance to the prop turning indicates a possible hydraulic lock in at least one of the cylinders.
7. What is the cause of hydraulic lock in radial engines ?  
Answer - Oil seeps by the piston rings and accumulates in the combustion chamber of lower cylinders. When a piston comes up on its compression stroke, the incompressible liquid seizes it.
8. What is meant by the term "Hot Start" when starting a jet engine ?  
Answer - Ignition occurs with an excessively rich mixture, leading to a rapid temperature rise that can exceed the exhaust gas temperature limit.
9. When towing an aircraft should you use the tow vehicle or aircraft brakes to stop the aircraft ?  
Answer - The tow vehicle brakes should be used except in an emergency then the aircraft brakes may be used.

## QUESTIONS AND ANSWERS

1. Name at least three possible hazards that may be encountered during typical ground operations, such as during engine run-up or taxiing ?  
Answer -  
The possibility of fire, especially during engine starting.  
Turning props, rotors, prop or jet blast and inlet areas.  
Other aircraft, vehicles, people and obstacles.  
Foreign objects such as rocks, gravel, rags or loose hardware.  
High noise levels that might cause hearing damage.  
Hydraulic lock in radial engines.  
Weathering of tailwheel aircraft.

10. Why should an aircraft technician become familiar with standard light signals ?  
Answer - Light signals may be used when taxiing an airplane without a radio or when a radio becomes inoperative on a tower controlled airport.
11. If a mixture of aviation gasoline and jet fuel is used in a reciprocating aircraft engine, what are the possible results ?  
Answer - Avgas contaminated by jet fuel must not be used in piston engines - the engine may be damaged or destroyed.
12. What does the number 100 signify in 100LL aviation gasoline ?  
Answer - It refers to the lean mixture performance number (or octane rating) of the fuel.
13. Is it permissible to use avgas in a turbine engine?  
Answer - Limited operation may be allowed by the manufacturer, continued use may reduce efficiency due to lead deposits on the turbine blades.
14. What are some of the possible outcomes of using a lower grade of avgas than the specified grade ?  
Answer - An increased chance of engine damage due to detonation, loss of engine power, and an increased probability of overheating.
15. Part 23.973 of the FAA regulations specifies that certain markings must be placed adjacent to fuel filler openings. What markings are used for reciprocating engine powered airplanes ?  
Answer - the filler openings must be fuel grade and the word "AVGAS".
16. Describe the important precautions that should be observed when fueling an aircraft.  
Answer - Be certain you are using the correct fuel, properly ground the aircraft and refueling unit, and protect the aircraft surfaces from hose and nozzle damage.
17. The marking requirements for oil tank filler openings are specified by FAR 23.1157. What markings are required for a piston engine powered airplane ?  
Answer - The word "OIL" and the permissible grades and/or types or a reference to the appropriate Airplane Flight Manual for permissible grades and/or types.
18. Where can the standard aircraft taxi hand signals be found ?  
Answer - In the Aeronautical Information Manual (AIM).
19. Under what conditions should a reciprocating engine be pre-oiled ?  
Answer - Prior to starting a new engine or one that has been preserved for storage. This ensures adequate lubrication on initial startup.
20. Under what conditions may automobile gasoline be used in an aircraft engine ?  
Answer - Only if approved by the FAA, usually by the issuance of a Supplemental Type Certificate (STC).
21. What are the indications of water in aircraft fuel after draining a sample from the fuel sumps ?  
Answer - The sample may have a cloudy or hazy appearance or a solid slug of water.

## MAINTENANCE PUBLICATIONS, FORMS AND RECORDS

1. What FAA-approved document gives the leveling means to be used when weighing an aircraft ?
  - a. Type Certificate Data Sheet.\*
  - b. AC 43.13-1B.
  - c. Manufacturer's maintenance manual.
2. What is the means by which the FAA notifies aircraft owners and other interested persons of unsafe conditions and prescribes the condition under which the product may continue to be operated ?
  - a. Airworthiness Directives.\*
  - b. Airworthiness Alerts.
  - c. Aviation Safety Data.
3. Which is an appliance major repair ?
  - a. Overhaul of a hydraulic pressure pump.\*
  - b. Repairs to a propeller governor or its control.
  - c. Troubleshooting and repairing broken circuits in landing lights circuits.
4. Which maintenance action is an airframe major repair ?
  - a. Changes to the wing or to fixed or movable control surfaces which affect flutter and vibration characteristics.
  - b. Rewinding the field coil of an electrical accessory.
  - c. The repair of portions of skin sheets by making additional seams.\*
5. An aircraft was not approved for return to service after an annual inspection and the owner wanted to fly the aircraft to another maintenance base. Which statement is correct?
  - a. The owner must obtain a special flight permit.\*
  - b. The aircraft may be flown without restriction up to 10 hours to reach another maintenance base.
  - c. The owner must obtain a restricted category type certificate.
6. Each person performing an annual or 100-hour inspection shall use a checklist that contains at least those items in the appendix of
  - a. 14 CFR Part 43.\*
  - b. 14 CFR Part 65.
  - c. AC 43.13-3.

7. Airworthiness Directives are issued primarily to
  - a. provide information about malfunction or defect trends.
  - b. present recommended maintenance procedures for correcting potentially hazardous defects.
  - c. correct an unsafe condition.\*
8. (1) A supplemental Type Certificate may be issued to more than one applicant for the same design change, providing each applicant shows compliance with the applicable airworthiness requirement.  
 (2) An installation of an item manufactured in accordance with the Technical Standard Order system requires no further approval for installation in a particular aircraft.  
 Regarding the above statements,
  - a. both No. 1 and No. 2 are true.
  - b. neither No. 1 nor No. 2 is true.
  - c. only No. 1 is true.\*
9. Primary responsibility for compliance with Airworthiness Directives lies with the
  - a. Aircraft owner or operator.\*
  - b. certificated mechanic holding an Inspection Authorization who conducts appropriate inspections.
  - c. certificated mechanic who maintains the aircraft.
10. An aircraft Type Certificate data Sheet contains
  - a. maximum fuel grade to be used.
  - b. control surface adjustment points.
  - c. location of the datum.\*
11. Suitability for use of a specific propeller with a particular engine-airplane combination can be determined by reference to what informational source ?
  - a. Propeller Specifications or Propeller Type Certificate Data Sheet.
  - b. Aircraft Specifications or Aircraft Type Certificate Data Sheet.\*
  - c. Alphabetical Index of Current Propeller Type Certificate Data Sheets, Specifications and Listings.
12. When an airworthy (at the time of sale) aircraft is sold, the Airworthiness Certificate
  - a. becomes invalid until the aircraft is reinspected and returned to service.
  - b. is voided and a new certificate is issued upon application by the new owner.
  - c. is transferred with the aircraft.\*
13. The issuance of an Airworthiness Certificate is governed by
  - a. 14 CFR Part 39.
  - b. 14 CFR Part 21.\*
  - c. 14 CFR Part 23.
14. Specifications pertaining to an aircraft, of which a limited number were manufactured under a type certificate and for which there is no current Aircraft Specifications, can be found in the
  - a. Aircraft Listing.\*
  - b. Annual Summary of Deleted and Discontinued Aircraft Specifications.
  - c. FAA Statistical Handbook of Civil Aircraft Specifications.
15. Where are technical descriptions of certificated propellers found ?
  - a. Applicable Airworthiness Directives.
  - b. Aircraft Specifications.
  - c. Propeller Type Certificate Data Sheet.\*
16. What information is generally contained in Aircraft Specifications or Type Certificate Data Sheets ?
  - a. Empty weight of the aircraft.
  - b. useful load of aircraft.
  - c. Control surface movements.\*
17. Placards required on an aircraft are specified in
  - a. AC43.13-1A.
  - b. FAR's under which the aircraft was Type Certificated.
  - c. Aircraft Specifications or type Certificate data Sheets.\*
18. Technical information about older aircraft models, of which no more than 50 remain in service, can be found in the
  - a. Aircraft Listing.\*
  - b. Annual Summary of Deleted and Discontinued Aircraft Specifications.
  - c. Alphabetical Index of Antique Aircraft.
19. (1) The FARs require approval after compliance with the data of a Supplement Type Certificate.  
 (2) An installation of an item manufactured in accordance with the Technical Standard Order System required no further approval for installation in a particular aircraft.  
 Regarding the above statements,
  - a. only No. 2 is true.
  - b. neither No. 1 nor No. 2 is true.
  - c. only No. 1. is true.\*
20. Which regulation provides information regarding instrument range markings for an airplane certificated in the normal category ?
  - a. 14 CFR Part 21.
  - b. 14 CFR Part 25.
  - c. 14 CFR Part 23.\*
21. (1) Propellers are NOT included in the Airworthiness Directive system.  
 (2) A certificated powerplant mechanic may make a minor repair on an aluminum propeller and approve for return to service.  
 Regarding the above statements,
  - a. only No. 2 is true.\*
  - b. both No. 1 and No. 2 are true.
  - c. neither No. 1 nor No. 2 is true.

- 22. An aircraft mechanic is privileged to perform major alternations on U.S. certificated aircraft; however, the work must be done in accordance with FAA-approved technical data before the aircraft can be returned to service. Which is NOT approved data ?
  - a. Airworthiness Directives.
  - b. AC 43.13-2A.\*
  - c. Supplemental Type Certificates.
  
- 23. What is the maintenance recording responsibility of the person who complies with an Airworthiness Directive ?
  - a. Advise the aircraft owner/operator of the work performed.
  - b. Make an entry in the maintenance record of that equipment.\*
  - c. Advise the FAA district office of the work performed, by submitting an FAA Form 337.
  
- 24. (1) Manufacture's data and FAA publications such as Airworthiness Directives, Type Certificate Data Sheets, and advisory circulars are all approved data. (2) FAA publications such as Technical Standard Orders, Airworthiness Directives, Type Certificate Data Sheets, and Aircraft Specifications and Supplemental Type Certificates are all approved data.
 

Regarding the above statements,

  - a. both No. 1 and No. 2 are true.
  - b. only No. 1 is true.
  - c. only No. 2 is true.\*
  
- 25. The Air transport Association of America (ATA) specification No. 100
  - (1) establishes a standard for the presentation of technical data in maintenance manuals.
  - (2) divides the aircraft into numbered systems and sub-systems in order to simplify locating maintenance instructions.

Regarding the above statements,

  - a. both No. 1 and No. 2 are true.\*
  - b. neither No. 1 nor No. 2 is true.
  - c. only No. 1 is true.
  
- 26. General Aviation Airworthiness Alerts
  - a. provide mandatory procedures to prevent or correct serious aircraft problems.
  - b. provide information about aircraft problems and suggested corrective actions.\*
  - c. provide temporary emergency procedures until Airworthiness Directives can be issued.
  
- 27. (Refer to Table 9.1) An aircraft has a total time in service of 468 hours. The Airworthiness Directives given was initially compiled with at 454 hours in service. How many additional hours in service may be accumulated before the Airworthiness Directive must again be compiled with
  - a. 46.
  - b. 200.
  - c. 186.\*

The following is the compliance portion of an Airworthiness Directive. "Compliance required as indicated, unless already accomplished :

- I. Aircraft with less than 500-hours total time in service : Inspect in accordance with instructions below 500-hours total time, or within the next 50-hours time in service after the effective date of this AD, and repeat after each subsequent 200 hours in service.
  
- II. Aircraft with 500-hours through 1,000-hours total time in service : Inspect in accordance with instructions below within the next 50-hours total time in service after the effective date of this AD, and repeat after each subsequent 200 hours in service.
  
- III. Aircraft with more than 1,000-hours time in service : Inspect in accordance with instructions below within the next 25-hours time in service after the effective date of this AD, and repeat after each subsequent 200 hours in service.

Table 9.1. Airworthiness Directive Excerpt.

28. The following is a table of airspeed limits as given in an FAA-issued aircraft specification.
- |                                      |           |
|--------------------------------------|-----------|
| Normal operating speed               | 260 knots |
| Never-exceed speed                   | 293 knots |
| Maximum landing gear operating speed | 174 knots |
| Maximum flap extended speed          | 139 knots |
- The high end of the white arc on the airspeed instrument would be at
- 260 knots.
  - 174 knots.
  - 139 knots.\*
29. A complete detailed inspection and adjustment of the valve mechanism will be made at the first 25 hours after the engine has been placed in service. Subsequent inspections of the valve mechanism will be made each second 50-hour period.
- From the above statement, at what intervals will valve mechanism inspections be performed ?
- 100 hours.\*
  - 50 hours.
  - 125 hours.
30. Check thrust bearing nuts for tightness on new or newly overhauled engines at the first 50-hour inspection following installation. Subsequent inspections on thrust bearing nuts will be made at each third 50-hour inspection.
- From the above statement, at what intervals should you check the thrust bearing nut for tightness ?
- 150 hours.\*
  - 200 hours.
  - 100 hours.
31. A repair, as performed on an airframe, shall mean
- the upkeep and preservation of the airframe including the component parts thereof.
  - the restoration of the airframe to a condition for safe operation after damage or deterioration.\*
  - simple or minor preservation operations and the replacement of small standard parts not involving complex assembly operations.
32. The replacement of fabric on fabriccovered parts such as wings, fuselages, stabilizers or control surfaces is considered to be a
- minor repair unless the new cover is different in any way from the original cover.
  - minor repair unless the underlying structure is altered or repaired.
  - major repair even though no other alteration or repair is performed.\*
33. Which is classified as a major repair ?
- The splicing of skin sheets.\*
  - Installation of new engine mounts obtained from the aircraft manufacturer.
  - Any repair of damaged stressed metal skin.
34. The replacement of a damaged vertical stabilizer with a new identical stabilizer purchased from the aircraft manufacturer is considered a
- minor alteration.
  - major repair.
  - minor repair.\*
35. Who is responsible for determining that materials used in aircraft maintenance and repair are of the proper type and conform to the appropriate standards ?
- The installing person or agency.\*
  - The owner of the aircraft.
  - The manufacturer of the aircraft.
36. Which of these publications contains standards for protrusion of bolts, studs and screws through self-locking nuts ?
- AC 43.13-2.
  - Aircraft Specifications or Type Certificate Data Sheets.
  - AC 43.13-1B.\*
37. The replacement of a damaged engine mount with a new identical engine mount purchased from the aircraft manufacturer is considered a
- minor alteration.
  - major repair.
  - minor repair.\*
38. Where is the record of compliance with Airworthiness Directives or manufacturer's service bulletins normally indicated ?
- FAA Form 337.
  - Aircraft maintenance records.\*
  - Flight manual.
39. If work performed on an aircraft has been done satisfactorily, the signature of an authorized person on the maintenance records for maintenance or alternations performed constitutes
- approval of the aircraft for return to service.
  - approval for return to service only for the work performed.\*
  - only verification that the maintenance or alternations were performed referencing maintenance data.
40. During an annual inspection, if a defect is found which makes the aircraft unairworthy, the person disapproving must
- void the aircraft's Airworthiness Certificate.
  - submit a Malfunction or Defect Report.
  - provide a written notice of the defect to the owner\*.
41. Where should you find this entry ?  
"Removed right wing from aircraft and removed skin from outer 6 feet. Repaired buckled spar 49 inches from tip in accordance with figure 8 in the manufacturer's structural repair manual No. 28-1"
- Aircraft engine maintenance record.
  - Aircraft minor repair and alteration record.
  - FAA Form 337.\*

42. Which aircraft record entry is the best description of the replacement of several damaged heli-coils in a casting ?
- Eight 1/4 - 20 inch standard heli-coils were replaced. The damaged inserts were extracted, the tapped holes gauged, then new inserts installed, and tangs removed.\*
  - Eight 1/4 - 20 inch standard heli-coils were installed in place of damaged ones.
  - Eight 1/4 - 20 inch standard heli-coil inserts were repaired by replacing the damaged inserts with a lock-type insert, after the tapped holes were checked for corrosion.
43. Which aircraft record entry best describes a repair of a dent in a tubular steel structure dented at a cluster ?
- Removed and replaced the damaged member.
  - Welded a reinforcing plate over the dented area.\*
  - Filled the damaged area with a molten metal and dressed to the original contour.
44. Who is responsible for making the entry in the maintenance records after an annual, 100 hour, or progressive inspection ?
- The owner or operator of the aircraft.
  - The person approving or disapproving for return to service.\*
  - The designee or inspector representing the FAA Administrator.
45. When approving for return to service after maintenance or alteration, the approving person must enter in the maintenance record of the aircraft
- the date the maintenance or alteration was begun, a description (or reference to acceptable data) of work performed, the name of the person performing the work (if someone else), signature and certificate number.
  - a description (or reference to acceptable data) of work performed, date of completion the name of the person performing the work (if someone else), signature, and certificate number.
  - a description (or reference to acceptable data) of work performed, date of completion, the name of the person performing the work (if someone else), signature, certificate number, and kind of certificate held.\*
46. What action is required when a minor repair is performed on a certificated aircraft ?
- An FAA Form 337 must be completed.
  - An entry in the aircraft's maintenance record is required.\*
  - The owner of the aircraft must annually report minor repairs to the FAA.
47. After making a certain repair to an aircraft engine that is to be returned to service, an FAA Form 337 is prepared. How many copies are required and what is the disposition of the completed forms?
- Two; one copy for the aircraft owner and one copy for the FAA.\*
  - Two; one copy for the FAA and one copy for the permanent records of the repairing agency or individual.
  - Three; one copy for the aircraft owner, one copy for the FAA, and one copy for the permanent records of the repairing agency or individual.
48. Who is responsible for upkeep of the required maintenance records for an aircraft ?
- The maintaining repair station or authorized inspector.
  - The maintaining certificated mechanic.
  - The aircraft owner.\*
49. An FAA Form 337 is used to record and document
- preventive and routine maintenance.
  - major and minor repairs, and major and minor alterations.
  - major repairs and major alterations.\*
50. After a mechanic holding an aircraft and powerplant rating completes a 100-hour inspection, what action is required before the aircraft is returned to service ?
- Make the proper entries in the aircraft's maintenance record.\*
  - An operational check of all systems.
  - A mechanic with an inspection authorization must approve the inspection.

#### QUESTIONS AND ANSWERS

1. What federal aviation regulation prescribes the requirements for issuance of a type certificate ?

Answer - FAR (14 CFR) Part 21.

2. What part of the FARs describes the airworthiness standards for Transport Category airplanes ?

Answer - FAR Part 25.

3. What part of the FARs describes the performance characteristics that a small aircraft must demonstrate in order to be airworthy ?

Answer - FAR Part 23.

4. Who is responsible for ensuring that only the most current information is used when performing maintenance on an aircraft ?

Answer - The person performing the maintenance.



5. Why are Airworthiness Directives issued ?  
Answer - To correct unsafe conditions found in aircraft, engines, propellers or appliances.
6. How does the FAA notify aircraft owners of unsafe conditions that must be corrected ?  
Answer - By issuing Airworthiness Directives.
7. How do you determine the timeframe within which AD compliance is required ?  
Answer - The AD contains the compliance time or period for completing the corrective action.
8. If a mechanic wishes to develop a checklist for an annual or 100-hour inspection, what publication contains the guidelines for the required inspection items ?  
Answer - FAR Part 43, Appendix D contains the scope and detail of an inspection checklist.
9. How can you determine if the repair of damage is a major or minor repair ?  
Answer - FAR Part 43, Appendix A defines major and minor repairs as well as preventive maintenance.
10. What publication might you consult for guidance when maintaining an old aircraft for which no maintenance manual exists ?  
Answer - AC 43.13-1B or its latest revision.
11. What are Advisory Circulars ?  
Answer - Non-regulatory information of interest to the aviation public.
12. What publication would you consult to determine an aircraft's (or engine's or propeller's) type design and its limitations ?  
Answer - The type Certificate Data Sheets and/or Aircraft Specifications.
13. In what FAA publication could you find a list of engines approved for use in a specific make and model of airplane ?  
Answer - In the Type Certificate Data Sheets and/or Aircraft Specifications.
14. What reference material can be used to determine if an aircraft is certificated in more than one category ?  
Answer - The type Certificate Data Sheets and/or Aircraft Specifications.
15. What is the name of the manual that the manufacturer provides to technicians who normally perform work on the systems and components of an aircraft ?  
Answer - The aircraft maintenance manual.
16. Under what circumstances is compliance with a manufacturer's service bulletin mandatory ?  
Answer - When the service bulletin is incorporated into an AD (or other approved data).
17. What kinds of publications are used by aircraft manufacturers to notify owners of design defects and product improvements ?  
Answer - Service Bulletins, Service Letters and Service Instructions.
18. If you need to determine the serviceable dimensional limits for an engine part, what publication would you consult ?  
Answer - The current engine manufacturer's overhaul manual.
19. How often is the summary of ADs published ?  
Answer - Every two years.
20. As a certificated mechanic, will you automatically receive all ADs ?  
Answer - No. ADs are automatically sent only to registered aircraft owners.
21. How are AD updates issued to subscribers to the Summary of Airworthiness Directives ?  
Answer - Through biweekly supplements.
22. Where do you find the minimum scope and detail requirements that a 100-hour inspection checklist must contain ?  
Answer - FAR Part 43, Appendix D.
23. Records of a major alteration must be made in what two places ?  
Answer - The aircraft maintenance records and FAA Form 337.
24. When completion of FAA Form 337 is required, how many copies are normally prepared and what is their distribution ?  
Answer - Two signed copies. One is given to the aircraft owner and one is sent to the local FAA Flight Standards District Office within 48 hours of the approval for return to service.

25. When an aircraft is sold, what do the regulations require regarding the disposition of records that contain the current status of Airworthiness Directives ?

Answer - The seller must transfer the records to the buyer at the time of sale.

26. For what period of the time must an aircraft owner maintain the records of a 100-hour inspection ?

Answer - Until the work is superseded or for one year after the inspection.

27. In what publication may a mechanic find an example of a maintenance record entry for a 100-hour inspection ?

Answer - FAR Part 43.11.

28. Where should a 100-hour inspection be record ?

Answer - In the appropriate maintenance record for the airframe, powerplant, propeller or appliance.

29. What items must be entered into the aircraft records after maintenance is performed ?

Answer -

- (1) A description of the work performed and/or reference to acceptable data.
- (2) The date the work was completed.
- (3) The signature, certificate number and type of certificate of the person approving the aircraft for return to service.

30. What person makes the final maintenance record entry a 100-hour inspection is completed ?

Answer - The person approving the aircraft for return to service.

31. What documents must be prepared when a required inspection is performed and defects are found which render the aircraft or engine unairworthy ?

Answer - The required maintenance entries must be made and a list of discrepancies and unairworthy items must be furnished to the owner.

32. What maintenance record entries are required to contain the aircraft total time in service ?

Answer - Only records of inspections require the total time.

33. What regulation authorizes a certificated mechanic who holds an Inspection Authorization to approve or disapprove a major repair or alteration ?

Answer - FAR 65.95.

34. Who has the authority to rebuild an aircraft engine and return the operating time to zero ?

Answer - Only the engine manufacturer or an overhaul facility approved by the manufacturer.

35. Are there any circumstances when more than two copies of Form 337 are required, and if so, when?

Answer - Yes. Three copies are required when a fuel tank is installed in the passenger or baggage compartment. The third copy must be kept aboard the aircraft.

36. How do the regulations define "time-in-service" in regard to maintenance record entries ?

Answer - With respect to maintenance entries, "time-in-service" begins when the aircraft leaves the surface of the earth until it touches it at the next point of landing.

37. What are the penalties for making fraudulent or intentionally false entries in any required record or report ?

Answer - The applicable airmen certificate(s) can be suspended or revoked.

38. What persons are authorized to make the required maintenance entry approving their turn to service after a progressive inspection is performed at a location other than the aircraft's home base ?

Answer - An applicable certificated mechanic.  
An appropriately rated repair station.  
The aircraft manufacturer.

39. What is the difference between the terms "overhaul" and "rebuilding" as they pertain to aircraft engine maintenance records ?

Answer - "Overhauled" engines must be tested to approved or acceptable current standards and technical data. "Rebuilt" engines must be tested to the same tolerance and limits as a new engine.

40. When performing an inspection required by FAR Part 91, what rotorcraft systems must be inspected in accordance with the manufacturer's maintenance manual or instructions for continued airworthiness ?

Answer - The drive shafts or similar systems.  
The main rotor transmission gearbox for obvious defects.  
The main rotor and center section.  
The auxiliary rotor on helicopters.

41. How can you determine that an aircraft part or appliance you receive is serviceable ?

Answer - By an approval for return to service in the maintenance record for the part or appliance.  
With a completed Form 337.

## MECHANIC PRIVILEGES AND LIMITATIONS

1. An aircraft owner was provided a list of discrepancies on an aircraft that was not approved for return to service after an annual inspection. Which statement is correct concerning who may correct the discrepancies?
  - a. Only a mechanic with an inspection authorization.
  - b. An appropriately rated mechanic.\*
  - c. Any certificated repair station.
2. Which of the following may a certificated airframe and powerplant mechanic perform on aircraft and approve for return to service ?
  1. a 100-hour inspection.
  2. an annual inspection, under specified circumstances.
  3. a progressive inspection, under specified circumstances.
  - a. 1, 3.\*
  - b. 1, 2, 3.
  - c. 1, 2.
3. Certificated mechanics with a powerplant rating may perform the
  - a. annual inspection required by the Federal Aviation Regulations on a powerplant or propeller or any component thereof, and may release the same to service.
  - b. 100-hour and/or annual inspections required by the Federal Aviation regulations on powerplants, propellers, or any components thereof and may release the same to service.
  - c. 100-hour inspection required by the Federal Aviation Regulations on a powerplant, propeller, or any component thereof, and may release the same to service.\*
4. The 100-hour inspection required by FAR's for certain aircraft being operated for hire may be performed by
  - a. persons working under the supervision of an appropriately rated mechanic, but the aircraft must be approved by the mechanic for return to service.
  - b. appropriately rated mechanics only if they have an inspection authorization.
  - c. appropriately rated mechanics and approved by them for return to service.\*
5. A person working under the supervision of a certificated mechanic with an airframe and powerplant rating is not authorized to perform
  - a. repair of a wing brace strut by welding.
  - b. a 100-hour inspection.\*
  - c. repair of an engine mount by riveting.
6. Certificated mechanics, under their general certificate privileges, may
  - a. perform minor repairs to instruments.
  - b. perform 100-hour inspection of instruments.\*
  - c. perform minor alterations to instruments.
7. An Airworthiness Directive required that a propeller be altered. Certificated mechanics could
  - a. perform and approve the work for return to service if it is a minor alteration.\*
  - b. not perform the work because it is an alteration.
  - c. not perform the work because they are not allowed to perform and approve for return to service, repairs or alterations to propellers.
8. FAA certificated mechanics may
  - a. approve for return to service a major repair for which they are rated.
  - b. supervise and approve a 100-hour inspection.
  - c. approve for return to service a minor alteration they have performed appropriate to the rating (s) they hold.\*
9. A certificated mechanic with a powerplant rating may perform the
  - a. annual inspection required by the FAR's on a powerplant or any component thereof and approve and return the same to service.
  - b. 100-hour inspection required by the FAR's on a powerplant or any component thereof and approve and return the same to service.\*
  - c. 100-hour inspection required by the FAR's on an airframe, powerplant, or any component thereof and approve and return the same to service.
10. What part of the FAR's prescribes the requirements for issuing mechanic certificates and associated ratings and the general operating rules for the holders of these certificates and ratings ?
  - a. 14 CFR Part 43.
  - b. 14 CFR Part 91.
  - c. 14 CFR Part 65.\*
11. A certificated mechanic shall not exercise the privileges of the certificate and rating unless, within the preceding 24 months, the Administrator has found that the certificate holder is able to do the work or the certificated holder has
  - a. served as a mechanic under the certificate and rating for at least 18 months.
  - b. served as mechanic under the certificate and rating for at least 12 months.
  - c. served as a mechanic under the certificate and rating for at least 6 months.\*
12. (1) Certificated mechanics with an airframe rating may perform a minor repair to an airspeed indicator providing they have the necessary equipment available.  
 (2) Certificated mechanics with a powerplant rating may perform a major repair to a propeller providing they have the necessary equipment available.  
 Regarding the above statements,
  - a. only No. 1 is true.
  - b. neither No. 1 nor No. 2 is true.\*
  - c. only No. 2 is true.

13. Who was the authority to approve for return to service a powerplant or propeller or any part thereof after a 100-hour inspection ?
- A mechanic with a powerplant rating.\*
  - Any certificated repairman.
  - Personnel of any certificated repair station.
14. Instrument repairs may be performed
- by the instrument manufacturer only.
  - by an FAA-approved instrument repair station.\*
  - on airframe instruments by mechanics with an airframe rating.
9. What authority does a mechanic have regarding approval for return to service ?
- Answer - A mechanic may approve an aircraft, airframe, engine, propeller or appliance for return to service in accordance with the provisions of FAR Part 65.
10. What are the privileges of an A & P mechanic regarding inspections ?
- Answer - A mechanic may perform and approve for return to service an airframe or engine following a 100-hour inspection.

### QUESTIONS AND ANSWERS

1. What publication should a mechanic consult to determine if a repair is considered major or minor?
- Answer - 14 CFR (FAR), Part 43, Appendix A.
2. Where in the FARs will you find the certification requirements for mechanics ?
- Answer - FAR Part 65.
3. What are the ratings issued under a mechanic's certificate ?
- Answer - Airframe and Powerplant.
4. What types of work may a certificated mechanic perform?
- Answer - A mechanic may perform or supervise maintenance, preventive maintenance, or alterations.
5. Is a certificated airframe mechanic allowed to perform maintenance on engines ?
- Answer - Not unless they are supervised by a certificated powerplant mechanic.
6. What are the limitations to a mechanic's privileges with regard to propellers ?
- Answer - A mechanic may not perform or supervise major repairs to, or major alterations of, propellers.
7. Is a mechanic allowed to repair or alter an aircraft instrument ?
- Answer - No. Mechanics may not perform any repairs or alterations on instruments.
8. What are the requirements for recent experience in order to exercise the privileges of your mechanic's certificate or rating ?
- Answer - You must have worked as a mechanic or technically supervised other mechanics for at least 6 months out of the past 24 months.
11. What is the duration of a mechanic's certificate?
- Answer - The certificate is valid until surrendered, suspended or revoked.
12. What are the privileges and limitations of an A & P mechanic regarding major repairs and alterations to airframes and engines and their approval for return to service ?
- Answer - A & P mechanics may perform major repairs and alterations but may not approve them for return to service unless they hold an Inspection Authorization.
13. In addition to performing maintenance, what other privileges are granted to a powerplant mechanic ?
- Answer - A powerplant mechanic may perform a 100-hour inspection on an engine and approve the engine for return to service.
14. When may a mechanic perform an annual inspection and return the aircraft to service ?
- Answer - When the mechanic holds an Inspection Authorization.
15. May a mechanic supervise an inspection (or a portion of an inspection) and then approve the aircraft for return to service ?
- Answer - No. The mechanic approving the aircraft for return to service must actually perform the inspection.
16. What is the duration of a temporary airman's certificate?
- Answer - 120 days.
17. If a mechanic's certificate is revoked, how long must he/she wait before applying for a new certificate ?
- Answer - One year unless the revocation order states otherwise.
18. What should a mechanic do if his or her temporary certificate is about to expire ?
- Answer - Contact a local FAA office and seek assistance.

19. Is a person with a private pilot's certificate allowed to perform maintenance and, if so, what are his/her limitations ?

Answer - A pilot may perform preventive maintenance in accordance with FAR Part 43.3, 43.7 and Appendix A on an airplane owned by the pilot. He or she can also approve the aircraft for return to service following that maintenance.

20. What are your requirements as an aircraft mechanic when you have a change of address ?

Answer - You must notify the FAA in writing within 30 days of any change to your permanent address.

## AIRCRAFT STRUCTURAL ASSEMBLY AND RIGGING

1. Longitudinal (fore and aft) structural members of a semi monocoque fuselage are called
  - a. spars and ribs.
  - b. longerons and stringers.\*
  - c. spars and stringers.
2. Which statement is true regarding a cantilever wings?
  - a. No external bracing is needed.\*
  - b. It requires only one lift strut on each side.
  - c. It has nonadjustable lift struts.
3. The monocoque fuselage largely on the strength of
  - a. bulkheads and longerons.
  - b. longerons and formers.
  - c. skin or covering.\*
4. Which part(s) of a semi monocoque fuselage prevent(s) tension and compression from bending the fuselage?
  - a. Bulkheads and skin.
  - b. Longerons and stringers.\*
  - c. The fuselage covering.
5. The auxiliary (tail) rotor of a helicopter permits the pilot to compensate for and/or accomplish which of the following?
  - a. Attitude and airspeed.
  - b. Lateral and yaw position.
  - c. Torque and directional control.\*
6. The vertical flight of a helicopter is controlled by
  - a. collective pitch changer.\*
  - b. cyclic pitch changer.
  - c. increasing or decreasing the RPM of the main rotor.
7. A decrease in pitch angle of the tail rotor blades on a helicopter
  - a. causes the tail to pivot in the opposite direction of torque rotation around the main rotor axis.
  - b. causes the tail to pivot in the direction of torque rotation around the main rotor axis.\*
  - c. is required to counteract main rotor torque
8. In rotorcraft external-loading, the ideal location of the cargo release is where the line of action passes
  - a. aft of the center of gravity at all times.
  - b. forward of the center of gravity at all times.
  - c. through the center of gravity at all times.\*
9. The acute angle formed by the chord line of a wing and the relative wind is known as the
  - a. angle of attack.\*
  - b. angle of incidence.
  - c. longitudinal dihedral angle.
10. A helicopter in forward flight, cruise configuration, changes direction by
  - a. varying the pitch of the main rotor blades.
  - b. changing rotor RPM.
  - c. tilting the main rotor disk in the desired direction\*.
11. The purpose in checking main rotor blade tracking is to determine the
  - a. extent of an out of balance condition during rotation.
  - b. flight path of the blades during rotation.\*
  - c. relative position of the blades during rotation.
12. In a hovering; helicopter equipped with a tail rotor, directional control is maintained by
  - a. tilting the main rotor disk in the desired direction.
  - b. changing the tail rotor RPM.
  - c. varying the pitch of the tail rotor blades.\*
13. If a single rotor helicopter is in forward horizontal flight, the angle of attack of the advancing blade is
  - a. equal of the retreating blade.
  - b. more than the retreating blade.
  - c. less than the retreating blade.\*
14. Main rotor blades that do not cone by the same amount during rotation are said to be out of
  - a. balance.
  - b. collective pitch.
  - c. track.\*
15. One purpose of the freewheeling unit required between the engine and the helicopter transmission is to
  - a. disconnect the rotor from the engine to relieve the starter load.\*
  - b. automatically disengage the rotor from the engine in case of an engine failure.
  - c. permit practice of auto rotation landings.
16. Which statement is correct concerning torque effect on helicopters?
  - a. As horsepower decreases, torque increases.
  - b. Torque direction is the opposite of rotor blade rotation.\*
  - c. Torque direction is the same as rotor blade rotation.

17. What is the purpose of the free wheeling unit in a helicopter drive system?
  - a. It releases the rotor brake for starting.
  - b. It relieves bending stress on the rotor blades during starting.
  - c. It disconnects the rotor whenever the engine stops or slows below the equivalent of rotor RPM.\*
18. Movement about the longitudinal axis (roll) in a helicopter is effected by movement of the
  - a. cyclic pitch control.\*
  - b. collective pitch control.
  - c. tail rotor pitch control.
19. Movement about the lateral axis (pitch) in a helicopter is effected by movement of the
  - a. collective pitch control.
  - b. cyclic pitch control.\*
  - c. tail rotor pitch control.
20. Wing dihedral, a rigging consideration on most airplanes of conventional design, contributes most of stability of the airplane about its
  - a. longitudinal axis.\*
  - b. lateral axis.
  - c. vertical axis.
21. Other than the manufacturer maintenance manual what other document could be used to determine the primary flight control surface deflection for an imported aircraft that is reassembled after shipment?
  - a. The certificate of airworthiness issued by the importing country.
  - b. Import manual for the aircraft.
  - c. Aircraft type certificate data sheet.\*
22. If a pilot reports that an airplane flies left wing heavy, this condition may be corrected by
  - a. increasing the dihedral angle of the left wing, or decreasing the dihedral angle of the right wing, or both.
  - b. increasing the angle of incidence of the left wing, or decreasing the angle of incidence of the right wing, or both.\*
  - c. adjusting the dihedral angle of the left wing so that differential pressure between the upper and lower wing surfaces is increased.
23. If the vertical fin of a single engine, propeller driven airplane is rigged properly, it will generally be parallel to
  - a. both the longitudinal and vertical axes.
  - b. the vertical axis but not the longitudinal axis.\*
  - c. the longitudinal axis but not the vertical axis.
24. An airplane which has good longitudinal stability should have a minimum tendency to
  - a. pitch.\*
  - b. roll.
  - c. yaw.
25. As the angle of attack of an airfoil increases, the center of pressure will
  - a. move toward the leading edge.\*
  - b. remain stationary because both lift and drag components increase proportionally to increased angle of attack.
  - c. move toward the trailing edge.
26. The angle of incidence is that acute angle formed by:
  - a. a line parallel to the wing from root to tip and a line parallel to the lateral axis of the aircraft.
  - b. a line parallel to the wing chord and a line parallel to the longitudinal axis of the aircraft.\*
  - c. the angular difference between the setting of the main airfoil and the auxiliary airfoil (horizontal stabilizer) in reference to the longitudinal axis of the aircraft.
27. An airplane's center of lift is usually located aft of its center of gravity
  - a. to improve stability about the longitudinal axis.
  - b. so that the airplane will have a tail heavy tendency.
  - c. so that the airplane will have a nose heavy tendency.\*
28. An airplane is controlled directionally about its vertical axis by the
  - a. ailerons.
  - b. elevator(s).
  - c. rudder.\*
29. The elevators of a conventional airplane are used to provide rotation about the
  - a. vertical axis.
  - b. longitudinal axis.
  - c. lateral axis.\*
30. Wash-in in the left wing of a monoplane, for purposes of rigging corrections after flight test, will have what effect on the lift and drag of what wing?
  - a. Both drag and lift will decrease due to decreased angle of attack.
  - b. Both drag and lift will increase due to the increased angle of attack.\*
  - c. The drag will decrease due to the effect of the lift increase.
31. What type of flap system increases the wing area and changes the wing camber?
  - a. Fowler flaps.\*
  - b. Slotted flaps.
  - c. Split flaps.
32. If the right wing of a monoplane is improperly rigged to greater angle of incidence than designated in the manufacturer's specifications, it will cause the
  - a. airplane to be off balance both laterally and directionally.\*
  - b. airplane to pitch and roll about the lateral axis.
  - c. right wing to have both an increased lift and a decreased drag.

33. The chord of a wing is measured from
  - a. leading edge to trailing edge.\*
  - b. wingtip to wingtip.
  - c. wing root to the wingtip.
34. When the lift of an airfoil increases, the drag will
  - a. increases while the lift is changing but will return to its original value.
  - b. also increase.\*
  - c. decrease.
35. What physical factors are involved in the aspect ratio of airplane wings?
  - a. Dihedral and angle of attack.
  - b. Span and chord.\*
  - c. Thickness and chord.
36. Improper rigging of the elevator trim tab system will affect the balance of the airplane about its
  - a. vertical axis.
  - b. lateral axis.\*
  - c. longitudinal axis.
37. An airplane that has a tendency to gradually increase a pitching moment that has been set into motion has
  - a. poor lateral stability.
  - b. poor longitudinal stability.\*
  - c. good lateral stability.
38. The purpose of wing slats is to
  - a. reduce stalling speed.\*
  - b. decrease drag.
  - c. increase speed on takeoff.
39. The angle of incidence of an airplane
  - a. does not change in flight.\*
  - b. affects the dihedral of the wings.
  - c. is that angle between the relative wind and the chord of the wing.
40. Buffeting is the intermittent application of forces to a part of an airplane. It is caused by
  - a. incorrect rigging of flaps.
  - b. an unsteady flow from turbulence.\*
  - c. incorrect rigging of ailerons.
41. Movement of an airplane along its lateral axis (roll) is also movement
  - a. around or about the longitudinal axis controlled by the elevator.
  - b. around or about the lateral axis controlled by the ailerons.
  - c. around or about the longitudinal axis controlled by the ailerons.\*
42. The primary purpose of stall strip is to
  - a. provide added lift at high angles of attack.
  - b. stall the inboard portion of the wings first.\*
  - c. provide added lift at slow speeds.
43. Rigging and alignment checks should not be undertaken in the open; however, if this cannot be avoided, the aircraft should be positioned
  - a. facing any direction since it makes no difference if the wind is steady (not gusting).
  - b. with the nose into the wind.\*
  - c. obliquely into the wind.
44. The correct dihedral angle can be determined by
  - a. measuring the angular setting of each wing at the rear spar with a bubble protractor.
  - b. placing a straightedge and bubble protractor across the spars while the airplane is in flying position.
  - c. using a dihedral board and bubble level along the front spar of each wing.\*
45. The dihedral angle of a wing may be measured by placing a straightedge and level protractor on the
  - a. wing chord.
  - b. front spar.\*
  - c. wing root.
46. Where would you find precise information to perform a symmetry alignment check for a particular aircraft?
  - a. Aircraft Specification or Type Certificate Data Sheet.
  - b. Manufacturer's service bulletins.
  - c. Aircraft service or maintenance manual.\*
47. Where is the buttock line or buttliness of an aircraft?
  - a. A height measurement left or right of and perpendicular to the horizontal center line.
  - b. A width measurement left of, and perpendicular to, the vertical center line.
  - c. A width measurement left or right of, and parallel, to, the vertical centerline.\*
48. Where is fuselage station No. 137 located?
  - a. Aft of the engine.
  - b. 137 inches aft of the zero or fixed reference line.\*
  - c. 137 centimeters aft of the nose or fixed reference line.
49. Proper wing twist in a sheet metal constructed wing can usually be checked by utilizing a
  - a. plumb bob, string, and straightedge.
  - b. straightedge, tape measure, and carpenter's square.
  - c. bubble level and special fixtures described by the manufacturer.\*
50. The vast majority of aircraft control cables are terminated with swagged terminals, that must be
  - a. corrosion treated to show compliance with manufacturers requirements after the swagging operation.
  - b. pull tested to show compliance with the manufactures requirements after the swagging operation.
  - c. checked with a go-no-go gauge before and after, to show compliance with the manufacturers requirements after the swagging operation.\*

51. What nondestructive checking method is normally used to ensure that the correct amount of swagging has taken place when installing swagged-type terminals on aircraft control cable?
- Check the surface of the swagged portion of the terminal for small cracks which indicates incomplete swagging.
  - Measure the finished length of the terminal barrel and compare with the beginning length.
  - Use a terminal gauge to check the diameter of the swagged portion of the terminal.\*
52. When inspecting a control cable turnbuckle for proper installation, determine that
- the terminal end threads are visible through the safety hole in the barrel.
  - the safety wire ends are wrapped a minimum of four turns around the terminal end shanks.\*
  - no more than four threads are exposed on either side of the turnbuckle barrel.
53. If all instructions issued by the swagging tool manufacturer are followed when swagging a cable terminal, the resultant swagged terminal strength should be
- the full rated strength of the cable.\*
  - 70 percent of the full rated strength of the cable.
  - 80 percent of the full rated strength of the cable.
54. Which is an acceptable safety device for a castle nut when installed on secondary structures?
- Star washer.
  - Cotter pin.\*
  - Lock washer
55. When used in close proximity to magnetic compasses, cotter pins are made of what material?
- Anodized aluminum alloy.
  - Corrosion resisting steel.\*
  - Cadmium plated low carbon steel.
56. When a fiber or nylon insert-type, self-locking nut can be threaded on a bolt or stud through the insert with only the fingers, it should be
- reused only in a different location.
  - rejected.\*
  - re-torqued frequently.
57. The purpose of the vertical fin is to provide
- lateral stability.
  - directional stability.\*
  - longitudinal stability.
58. How are changes in direction of a control cable accomplished?
- Pulleys.\*
  - Fair leads.
  - Bell cranks.
59. What is the smallest size cable that may be used in aircraft primary control systems?
- 1/8 inch.\*
  - 1/4 inch.
  - 5/16 inch.
60. After repairing or recovering a rudder, the surface should be rebalanced
- in its normal flight position.
  - to its span wise axis.
  - to manufacturer's specifications.\*
61. Placing a piece of cloth around a stainless steel control cable and running it back and forth over the length of the cable is generally a satisfactory method of
- applying par-al-ketone.
  - inspecting for wear or corrosion.
  - inspecting for broken wires.\*
62. The cable operated control system of an all metal aircraft, not incorporating a temperature compensating device, has been rigged to the correct tension in a heated hangar. If the aircraft is operated in very cold weather, the cable tension will
- decrease when the aircraft structure and cables become cold.\*
  - increase when the aircraft structure and cables become cold.
  - be unaffected if stainless steel cable is installed.
63. Very often, repairs to a control surface require static rebalancing of the control surface. Generally, flight control balance condition may be determined by
- suspending the control surface from its leading edge in the streamline position and checking weight distribution.
  - the behavior of the trailing edge when the surface is suspended from its hinge points.\*
  - checking for equal distribution of weight throughout the control surface.
64. Excessive wear on both the sides of a control cable pulley groove is evidence of
- excessive cable tension.
  - pulley misalignment.\*
  - cable misalignment.
65. Fair leads should never deflect the alignment of a cable more than
- 12°
  - 3°\*
  - 8°
66. Where does the breakage of control cable wires occur most frequently?
- Breakage usually occurs where cables are swagged to turnbuckle and ball terminals.
  - Breakage sites are unpredictable and usually occur randomly anywhere along the length of a cable.
  - Breakage usually occurs where cables pass over pulleys and through fair leads.\*



67. To which system is differential control associated?  
 a. Aileron.\*  
 b. Trim.  
 c. Elevator.
68. Which statement concerning the 100-hour inspection of an plane equipped with a push pull tube type control system is true?  
 a. The terminal end threads of the turnbuckles should be visible through the safety hole in the barrel.  
 b. The threaded rod ends should not be adjusted in length for rigging purposes because the rod ends have been properly positioned and staked during manufacture.  
 c. The threaded rod ends should be checked for the amount of thread engagement by means of the inspection hole provided.\*
69. Control cables are adjusted properly and the control surfaces tend to vibrate, the probable cause is  
 a. oil can effects on the control surfaces.  
 b. excessive cable tension.  
 c. worn attachment fittings.\*
70. Aircraft flight control trim systems must be designed and installed so that the  
 a. pilot can determine the relative position of the trim tab from the cockpit.\*  
 b. operating control and the trim tab will always move in the same direction.  
 c. trim system will disengage or become inoperative if the primary flight control system fails.
71. Stability about the axis which runs parallel to the line of flight is referred to as  
 a. longitudinal stability.  
 b. lateral stability.\*  
 c. directional stability.
72. The purpose of spring tabs or servo tabs is to  
 a. contribute to the static balance of control surface.  
 b. make in flight trim adjustments possible.  
 c. assist the pilot in moving the control surfaces.\*
73. The control stick of an aircraft with properly rigged flight controls is moved rearward and to the left, the right aileron all move  
 a. up and the elevator will move down.  
 b. down and the elevator will move down.  
 c. down and the elevator will move up.\*
74. Movement of the cockpit control toward the nose down position during a ground operational check of the elevator trim tab to move in which direction?  
 a. Downward regardless of elevator position.  
 b. Upward regardless of elevator position.\*  
 c. Downward if the elevator is in the UP position and upward if the elevator is in the DOWN position.
75. If the control stick of an aircraft with properly rigged flight controls is moved forward and to the right, the left aileron will move  
 a. down and the elevator will move up.  
 b. up and the elevator will move down.  
 c. down and the elevator will move down.\*
76. If the travel of an airplane's controls is correct but the cables are rigged exceptionally tight, what probable effect will this have when flying the airplane?  
 a. The pilot will be unable to fly the airplane hands off.  
 b. The airplane will be heavy on the controls.\*  
 c. The airplane will tend to fall off on one wing.
77. During inspection of the flight control system of an airplane equipped with differential-type aileron control, side to side movement of the control stick will cause  
 a. each aileron to have greater down travel (from the streamlined position) than up travel.  
 b. the left aileron to move through a greater number of degrees (from full up to full down) than the right aileron.  
 c. each aileron to have a greater up travel (from the streamlined position) than down travel.\*
78. A universal propeller protractor used to measure the degrees of aileron travel should be zeroed  
 a. with the aileron in the DOWN position.  
 b. with the aileron in the NEUTRAL position.\*  
 c. when the aircraft is in a level flight attitude.
79. The universal propeller protractor can be used to measure  
 a. propeller track.  
 b. aspect ratio of a wing.  
 c. degrees of flap travel.\*
80. (Refer to figure 9.27) Identify the cable that is used in primary control systems and in other places where operation over pulleys is frequent.  
 a. 2.  
 b. 1.  
 c. 3.\*
81. A tension regulator in the flight control cable system of a large all metal aircraft is used primarily to  
 a. provide a means of changing cable tension in flight.  
 b. retain a set tension.\*  
 c. increase the cable tension in cold weather.
82. (Refer to figure 9.28) When the outside air temperature is 80 °F, select the acceptable 3/16 cable tension range.  
 a. 130 pounds minimum, 140 pounds maximum.  
 b. 120 pounds minimum, 140 pounds maximum.  
 c. 117 pounds minimum, 140 pounds maximum.\*

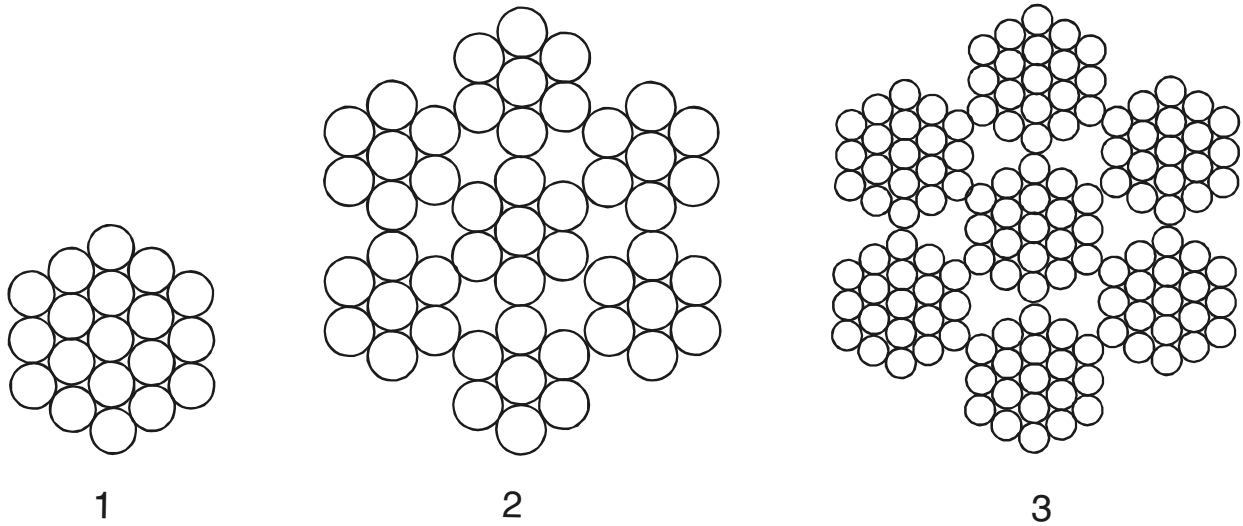


Figure 9.27.

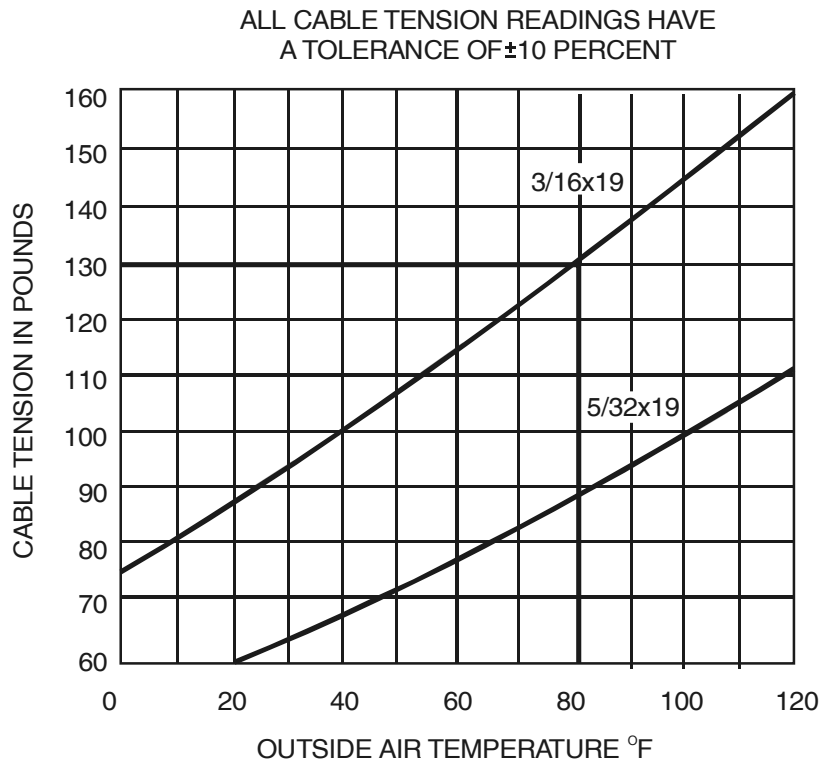


Figure 9.28.

- 83. Differential control on an aileron system means that
  - a. one aileron on the wing travels further up than the aileron on the opposite wing to adjust for wash in and wash out.
  - b. the up travel is more than the down travel.\*
  - c. the down travel is more than the up travel.
- 84. Why is it generally necessary to jack an aircraft indoors for weighing?
  - a. So that air currents do not destabilize the scales.\*
  - b. So weighing scales may be calibrated to 0 pounds.
  - c. So aircraft may be placed in a level position.
- 85. Which should be accomplished before jacking an aircraft?
  - a. Install critical stress panels or plates.\*
  - b. Determine that the fuel tanks are empty.
  - c. Make sure the aircraft is leveled laterally.

**QUESTIONS AND ANSWERS**

- 1. What is the function of a vortex generator?

Answer— It is designed to delay or prevent separation of the boundary layer.

2. What are the three axes of an airplane?  
Answer– Longitudinal, lateral, and vertical.
3. What are the three primary flight controls of an aircraft?  
Answer– The ailerons, elevator, and rudder.
4. Name several secondary flight controls and describe their general purpose?  
Answer– Secondary flight controls consist of various types of trim tabs such as balance tabs, anti-servo and servo tabs, and spring tabs. Their function is to assist the pilot in moving the controls and to trim the aircraft to fly hands-off.
5. Name several types of auxiliary flight controls and describe their general purpose?  
Answer–The auxiliary flight controls consist of the various high-lift devices used during low-speed flight such as leading and trailing edge flaps, slats, slots, speed brakes, etc.
6. What is a servo trim tab?  
Answer– It is an auxiliary control, positioned by the movement of a cockpit control and designed to create aerodynamic forces to assist in moving a control surface.
7. What is a spring tab?  
Answer– It is an auxiliary control designed to aid the movement of a primary control at high speeds when control forces become too high.
8. What is a balance trim tab?  
Answer– It is an auxiliary control designed to create aerodynamic forces to assist in moving a control surface. The tab is positioned by a control rod connected to the fixed surface on the same side as the horn on the tab.
9. What are four most common types of high lift devices?  
Answer– Leading and trailing edge flaps, slats, and slots.
10. Describe some of the tools used to check control surface travel?  
Answer–A universal propeller protractor or special control surface protractor.
11. Name three mechanical methods by which flight control systems may be actuated.  
Answer– Cables, push-pull rods, and torque tubes.
12. What is a fair lead ?  
Answer– It is a device to prevent a cable from rubbing on the aircraft structure.
13. What are the most likely places for a control cable to wear or break ?  
Answer– Where the cables pass over pulleys or through fair leads.
14. What information is required before a cable rigging chart can be used?  
Answer– The ambient temperature and the cable size.
15. What is the function of a cable tension regulator?  
Answer– It automatically adjusts the cable tension to compensate for expansion and contraction in the aircraft structure.
16. Describe the function of a rotorcraft collective pitch control.  
Answer–the collective control causes each rotor blade to change its pitch angle by the same amount, thus increasing or decreasing the lift produced by the rotor.
17. Describe the function of a rotorcraft cyclic pitch control.  
Answer– The cyclic control tilts the main rotor disc by changing the pitch angle of each rotor blade during its cycle of rotation, which causes the helicopter to move in the direction to rotor tilts.
18. What mechanism is most commonly used to compensate for the torque produced by the main rotor of a helicopter?  
Answer– The tail (or anti-torque) rotor.
19. How is the amount of thrust produced by the tail rotor controlled?  
Answer– By moving the foot pedals.
20. Why should control surfaces be locked when an aircraft is parked?  
Answer– To prevent damage from the wind.

## WOOD, COMPOSITE & TRANSPARENT PLASTIC STRUCTURES

1. Laminated wood spars may be substituted for solid rectangular wood spars
  - a. only in certain instances where the primary load is shared by one or more other original structural member.
  - b. only upon specific approval by the manufacturer or the FAA.
  - c. if the same quality wood is used in both.\*
2. The strength of a well designed and properly prepared wood splice joint is provided by the
  - a. bearing surface of the wood fibers.
  - b. glue.\*
  - c. reinforcement plates.
3. Where is information found concerning acceptable species substitutions for wood materials used in aircraft repair?
  - a. Technical Standard Orders.
  - b. Aircraft Specifications or Type Certificate Data Sheets.
  - c. AC 43.13-1B.\*
4. In cases of elongated boltholes in a wood spar or cracks in the vicinity of boltholes,
  - a. it is permissible to ream the hole, plug with hard wood, and redrill.
  - b. a new section of spar should be spliced in or the spar replaced entirely.\*
  - c. the spar may be reinforced by using hardwood reinforcing plates.
5. A faint line running across the grain of a wood spar generally indicates
  - a. compression failure.\*
  - b. shear failure.
  - c. decay.
6. Which statement about wood decay is correct?
  - a. Decay that occurs before the wood is seasoned does not affect the strength of the finished piece.
  - b. A limited amount of certain kinds of decay is acceptable in aircraft woods since decay affects the binding between the fibers and not the fibers themselves.
  - c. Decay is not acceptable in any form or amount.\*
7. Which of the following conditions will determine acceptance of wood with mineral streaks?
  - a. Local irregularities do not exceed limitations specified for spiral and diagonal grain.
  - b. Careful inspection fails to reveal any decay.\*
  - c. They produce only a small effect on grain direction.
8. The I beam wooden spar is routed to
  - a. reduce weight.\*
  - b. increase strength.
  - c. obtain uniform strength.
9. Pin knot clusters are permitted in wood aircraft structure provided
  - a. no pitch pockets are within 12 inches.
  - b. they produce a small effect on grain direction.\*
  - c. they have no mineral streaks.
10. The cantilever wing uses
  - a. the skin to carry most of the load to the wing butt.
  - b. no external bracing.\*
  - c. external struts or wire bracing.
11. Laminated wood is sometimes used in the construction of highly stressed aircraft components. This wood can be identified by its
  - a. similarity to standard plywood construction.
  - b. parallel grain construction.\*
  - c. perpendicular grain construction.
12. When patching a plywood skin, abrupt changes in cross sectional areas which will develop dangerous stress concentration should be avoided by using
  - a. circular or elliptical patches.\*
  - b. square patches.
  - c. doublers with any desired shaped patches.
13. Glue deterioration in wood aircraft structure is indicated
  - a. When a joint has separated and the glue surface shows only the imprint of the wood with no wood fibers clinging to the glue.\*
  - b. by any joint separation.
  - c. when a joint has separated and the glue surface shows pieces of wood and/or wood fibers clinging to the glue.
14. Compression failures in wood aircraft structures are characterized by buckling of the fibers that appear as streaks on the surface
  - a. at right angles to the growth rings.
  - b. at right angles to the grain.\*
  - c. parallel to the grain.
15. Sandwich panels made of metal honeycomb construction are used on modern aircraft because this type of construction
  - a. may be repaired by gluing replacement skin to the inner core material with thermoplastic resin.
  - b. has a high strength to weight ratio.\*
  - c. is lighter than single sheet skin of the same strength and is more corrosion resistant.
16. (1) When performing a ring (coin tap) test on composite structures, a change in sound may be due to damage or to transition to a different internal structure.  
 (2) The extent of separation damage in composite structures is most accurately measured by a ring (coin tap) test. Regarding the above statements,
  - a. only No. 1 is true.\*
  - b. only No. 2 is true.
  - c. both No. 1 and No. 2 are true.

17. Which of these methods may be used to inspect fiber-glass/honeycomb structures for entrapped water?
  1. Acoustic emission monitoring.
  2. X-ray.
  3. Backlighting.
  - a. 1 and 2. \*
  - b. 2 and 3.
  - c. 1 and 3.
18. When balsa wood is used to replace a damaged honey comb core, the plug should be cut so that
  - a. the grain is perpendicular to the skin.\*
  - b. the grain is parallel to the skin.
  - c. it is about 1/8-inch undersize to allow sufficient bonding material to be applied.
19. When repairing puncture type damage of a metal faced laminated honeycomb panel, the edges of the doubler should be tapered to
  - a. whatever is desired for a neat, clean appearance.
  - b. 100 times the thickness of the metal.\*
  - c. two times the thickness of the metal.
20. One of the best ways to assure that a properly prepared batch of matrix resin has been achieved is to
  - a. perform a chemical composition analysis.
  - b. have mixed enough for a test sample.\*
  - c. test the viscosity of the resin immediately after mixing.
21. Composite inspection conducted by means of acoustic emission monitoring
  - a. pick up the "noise" of corrosion or other deterioration occurring.\*
  - b. create sonogram pictures of the areas being inspected.
  - c. analyze ultrasonic signals transmitted into the parts being inspected.
22. What precaution, if any, should be taken to prevent corrosion inside a repaired metal honeycomb structure?
  - a. Prime the repair with a corrosion inhibitor and seal from the atmosphere.\*
  - b. Paint the outside area with several coats of exterior paint.
  - c. None. Honeycomb is usually made from a man made or fibrous material which is not susceptible to corrosion.
23. One method of inspecting a laminated fiberglass structure that has been subjected to damage is to
  - a. strip the damaged area of all paint and shine a strong light through the structure.\*
  - b. use an eddy current probe on both side of the damaged area.
  - c. use dye penetrant inspection procedures, exposing the entire damaged area to the penetrant solution.
24. When inspecting a composite panel using the ring test/tapping method, a dull thud may indicate
  - a. separation of the laminates.\*
  - b. an area of too much matrix between fiber layers.
  - c. less than full strength curing of the matrix.
25. How many of the following are benefits of using microballoons when making repairs to laminated honeycomb panels?
  1. Greater concentrations of resin in edges and corners.
  2. Improved strength to weight ratio.
  3. Less density.
  4. Lower stress concentrations.
  - a. Three.\*
  - b. Four.
  - c. Two.
26. The length of time that a catalyzed resin will remain in a workable state is called the
  - a. pot life.\*
  - b. service life.
  - c. shelf life.
27. A category of plastic material that is capable of softening or flowing when reheated is described as a
  - a. thermoset.
  - b. thermoplastic.\*
  - c. thermocure.
28. The classification for high tensile strength fiberglass used in aircraft structures is
  - a. S.\*
  - b. G
  - c. E.
29. Which is an identifying characteristic of acrylic plastics?
  - a. Zinc chloride will have no effect.\*
  - b. Has a yellowish tint when viewed from the edge.
  - c. Acetone will soften plastic, but will not change its color.
30. What is the material layer used within the vacuum bag pressure system to absorb excess resin during curing called?
  - a. Release.
  - b. Bleeder.\*
  - c. Breather.
31. Proper pre-preg composite lay-up curing is generally accomplished by
  1. applying external heat.
  2. room temperature exposure.
  3. adding a catalyst or curing agent to the resin.
  4. applying pressure.
  - a. 1 and 4.\*
  - b. 2 and 3.
  - c. 1, 3, and 4.

32. When repairing large, flat surfaces with polyester resins, warping of the surface is likely to occur. One method of reducing the amount of warpage is to
- use less catalyst than normal so the repair will be more flexible.
  - add an extra amount of catalyst to the resin.
  - use short strips of fiberglass in the bonded repair\*.
33. When making repairs to fiberglass, cleaning of the area to be repaired is essential for a good bond. The final cleaning should be made using
- MEK (methyl ethyl ketone).\*
  - a thixotropic agent.
  - soap, water, and a scrub brush.
34. When necessary, what type of cutting fluid is usually acceptable for machining composite laminates?
- Water only.\*
  - Water displacing oil.
  - Water soluble oil.
35. Fiberglass laminate damage not exceeding the first layer or ply can be repaired by
- sanding the damaged area until aerodynamic smoothness is obtained.
  - trimming the rough edges and sealing with paint.
  - filling with a putty consisting of a compatible resin and clean, short glass fibers.\*
36. Fiberglass damage that extends completely through a laminated sandwich structure
- must be filled with resin to eliminate dangerous
  - may be repaired.\*
  - may be filled with putty which is compatible with resin.
37. Fiberglass laminate damage that extends completely through one facing and into the core
- require the replacement of the damaged core and facing.\*
  - can be repaired by using a typical metal facing patch.
  - cannot be repaired.
38. Repairing advanced composites using materials and techniques traditionally used for fiberglass repairs is likely to result in
- an unairowrthy repair.\*
  - improved wear resistance to the structure.
  - restored strength and flexibility.
39. The preferred way to make permanent repairs on composites is by
- bonding on metal or cured composite patches.
  - riveting on metal or cured composite patches.
  - laminating on new repair plies.\*
40. Which of the following, when added to wet resins, provide strength for the repair of damaged fastener holes in composite panels?
- Microballoons.
  - Flox.
  - Chopped fibers.
- 1 and 3.
  - 1,2, and 3.
  - 2 and 3 \*
41. The part of a replacement honeycomb core that must line up with the adjacent original is the
- cell edge.
  - cell side.
  - ribbon direction.\*
42. Which of the following are generally characteristic of aramid fiber (Kevlar) composites?
- High tensile strength.
  - Flexibility.
  - Stiffness.
  - Corrosive effect in contact with aluminum.
  - Ability to conduct electricity.
- 1,3, and 5,
  - 1 and 2.\*
  - 2, 3, and 4.
43. Which of the following are generally characteristic of carbon/graphite fiber composites?
- Flexibility.
  - Stiffness.
  - High compressive strength.
  - Corrosive effect in contact with aluminum.
  - Ability to conduct electricity.
- 1, 3, and 5.
  - 2, 3, and 4.\*
  - 1 and 3.
44. If an aircraft's transparent plastic enclosures exhibit fine cracks which may extend in a network over or under the surface or through the plastic, the plastic is said to be
- brinelling.
  - hazing.
  - crazing.\*
45. When installing transparent plastic enclosures which are retained by bolts extending through the plastic material and self-locking nuts, the nuts should be
- tightened to a firm fit, then backed off one full turn.\*
  - tightened to a firm fit, plus one full turn.
  - tightened to a firm fit.
46. Which is considered good practice concerning the installation of acrylic plastics?
- When rivets are used, adequate spacer or other satisfactory means to prevent excessive tightening of the frame to the plastic should be provided.\*
  - When rivets or nuts and bolts are used, slotted holes are not recommended.
  - When nuts and bolts are used, the plastic should be installed hot and tightened to a firm fit before the plastic cools.
47. The coefficient of expansion of most plastic enclosure materials is
- greater than steel but less than aluminum.
  - greater than both steel and aluminum.\*
  - less than either steel or aluminum.

48. If no scratches are visible after transparent plastic enclosure materials have been cleaned, their surfaces should be
- covered with a thin coat of wax.\*
  - buffed with a clean, soft, dry cloth.
  - polished with rubbing compound applied with a damp cloth.
49. What is the most common method of cementing transparent plastics?
- Bevel method.
  - Soak method.\*
  - Heat method.
50. When holes are drilled completely through Plexiglas, a
- wood drill should be used.
  - standard twist drill should be used.
  - specially modified twist drill should be used.\*
51. What is the purpose of a gusset or gusset plate used in the construction and repair of aircraft structures?
- To join and reinforce intersecting structural members.\*
  - To provide access for inspection of structural attachments.
  - To hold structural members in position temporarily until the permanent attachment has been completed.
7. Is compression wood acceptable for structural repairs?
- Answer– No.
8. Why should the various pieces of wood being joined be kept in the same room for at least 24 hours prior to joining?
- Answer– To allow the moisture content to equalize, thereby minimizing dimensional changes in the wood.
9. Why is it important to consider the open-assembly time when gluing wooden structures?
- Answer– If the maximum open-assembly time is exceeded, the joint may fail since the glue may begin setting up before the joint is assembled.
10. Why is it important to apply the proper clamping pressure to a glue joint?
- Answer– Clamping forces air out of the joint, brings the wood surfaces together evenly and is, in part, responsible for the strength of the glue line.
11. Describe some of the methods used to apply pressure to glue joints.
- Answer– Clamps, nailing strips, power presses, brads, nails, and small screws.

#### QUESTIONS AND ANSWERS

1. What are the three forms of wood commonly used in aircraft construction?
- Answer– Solid, laminated, and plywood.
2. What type of wood should be used when splicing or reinforcing plywood webs?
- Answer– The same type of plywood as originally used.
3. Name at least four different types of defects found in wood.
- Answer– Knots, checks, splits, pitch pockets, cross grain, curly grain, decay, dry rot, etc.
4. Can a section of wood containing a hard knot be used?
- Answer– Yes, within specified limits.
5. What type of glue may have been used in older wooden aircraft construction that requires careful inspection to detect deterioration?
- Answer– Casein glue.
6. What are the three types of glues used in modern aircraft construction and repair?
- Answer– Resorcinol glue, Phenol-formaldehyde glue, and epoxy resin glue.
12. What minimum curing temperature should be observed when joining wood with various adhesives?
- Answer– 70 degrees Fahrenheit or as specified by the glue manufacturer.
13. When inspecting wood structures, why might it be important to consider stains and discolored areas?
- Answer– Stains and discoloration usually accompany decay and/or rot.
14. Describe the acceptable methods used to repair elongated bolt holes found in a wooden wing spar.
- Answer– Remove the section containing the elongated holes and splice in a new section or replace the entire spar.
15. What type of joint is used to splice a solid or rectangular wood spar?
- Answer– A scarf joint
16. In what areas are splices to a wood spar prohibited?
- Answer– Under an attachment fitting for the wing root, landing gear, engine-mount, lift, or inter-plane strut.

17. What is the maximum number of splices allowed for any single spar?  
Answer– Two
18. Describe the characteristics of a scarf joint.  
Answer– The pieces to be joined are tapered or beveled on a slope of 1 to 10 or 1 to 12.
19. Why must the beveled cut be accurate on both pieces of wood being repaired with a scarfed joint?  
Answer the two pieces must match exactly to ensure a tight glue joint.
20. What are the two primary uses for plywood in aircraft construction?  
Answer– Gusset (or reinforcing) plates and aircraft skin.
21. Provide examples of at least three types of plywood skin repairs.  
Answer– Splayed patches, surface patches, plug patches, and scarfed patches.
22. What type of patch should be used to repair small holes in thin plywood skin if the skin is less than 1/10th inch thick?  
Answer– A splayed patch may be used if the hole can be cleared out to a diameter of less than 15 thicknesses of the skin.
23. What should be done to prevent a plywood patch and the pressure plate from sticking together if glue is extruded from the joint?  
Answer– Place a piece of waxed paper or vinyl plastic between the patch and the pressure plate.
24. Why are light weight steel bushings sometimes used in wooden structures?  
Answer– Bushings prevent the wood from being crushed when bolts are tightened.
25. What is the purpose of large surface area washers when used on wooden structures?  
Answer– Large washers provide additional bearing area for hardware to help preclude damage to the wood when the hardware is tightened.
26. Name several facings and core materials used in bonded honeycomb structures intended for special applications.  
Answer– Stainless steel, titanium, magnesium, plywood, glass, nylon, and cotton cloth.
27. Describe the construction of a bonded honeycomb structure.  
Answer– It is a laminated structure that has a solid facing bonded to either side of a core consisting of open, six-sided cells.
28. What must be done with a damaged area in a bonded honeycomb structure prior to beginning repairs?  
Answer– The damaged area must be completely removed.
29. A drill bit used for drilling composites should have an included angle of how many degrees?  
Answer– 135 degrees.
30. What are the most common causes for delamination of a composite structure?  
Answer– Sonic vibration, expansion of internal moisture, liquid leakage, and a manufacturing error.
31. What type of defect in, or damage to, a bonded honeycomb structure can be repaired using the potted repair method?  
Answer– Filling a hole.
32. Name some of the factors that cause crazing in transparent plastic window and windshields?  
Answer– Exposure to ultraviolet light, stress, solvents, and improper handling.
33. How should a hole be drilled in plexiglass to avoid damage to the hole when the drill breaks through to the underside?  
Answer– Back up the plastic with a piece of wood and feed the drill slowly.

## AIRCRAFT FABRIC COVERING

- When and how is finishing tape applied on a fabric covered aircraft?
  - Doped on immediately prior to the finish coat.
  - Doped on after the first or second coat of dope.\*
  - Sewed or laced on before dope is applied.
- The determining factor(s) for the selection of the correct weight of textile fabric to be used in covering any type of aircraft is the
  - speed of the aircraft.
  - maximum wing loading.
  - speed of the aircraft and maximum wing loading.\*



3. How many fabric thicknesses will be found in a French fell seam?
  - a. Three.
  - b. Four.\*
  - c. Five.
4. Finishing tape (surface tape) is used for what purpose?
  - a. To provide additional anti-tear resistance under reinforcement tape.
  - b. To help prevent "ripple formation" in covering fabric.
  - c. To provide additional wear resistance over the edges of fabric forming structures.\*
5. Moisture, mildew, chemicals, and acids have no effect on
  - a. glass fabric.\*
  - b. linen fabric.
  - c. dacron fabric.
6. The best method of repair for a fabric covered surface which has an L shaped tear, each leg of which is approximately 14 inches long, is to
  - a. sew with a baseball stitch from the center of the tear out toward the extremity of each leg and then dope on a patch.\*
  - b. re-cover the entire bay in which the tear is located.
  - c. sew from the end of each leg to the center of the tear with a baseball stitch and then dope on a patch.
7. The strength classification of fabrics used in aircraft covering is based on
  - a. bearing strength.
  - b. tensile strength.\*
  - c. shear strength.
8. Fabric rejuvenator
  - a. restores fabric strength and tautness to at least the minimum acceptable level.
  - b. restores the condition of dope coatings.\*
  - c. penetrates the fabric and restores fungicidal resistance.
9. (1) Machine sewn seams in aircraft covering fabrics may be of the folded fell or French fell types. (2) A plain lapped seam is never permissible. Regarding the above statements,
  - a. only No. 2 is true.
  - b. only No. 1 is true.\*
  - c. both No. 1 and No. 2 are true.
10. When testing the strength of Grade A cotton fabric covering an aircraft that requires only intermediate grade, the minimum acceptable strength the fabric must have is
  - a. 70 percent of its original strength.
  - b. 70 percent of the original strength for intermediate fabric.\*
  - c. 56 pounds per inch warp and fill.
11. When dope-proofing the parts of the aircraft structure that comes in contact with doped fabric, which of the following provides an acceptable protective coating?
  1. Aluminum foil.
  2. Resin impregnated cloth tape.
  3. Any one-part type metal primer.
  4. Cellulose tape.
  - a. 3 and 4.
  - b. 1 and 2.
  - c. 1 and 4.\*

#### QUESTIONS AND ANSWERS

1. Aircraft covering fabrics are made of materials from what two sources?

Answer— Organic materials and synthetic materials.

2. How would you determine the strength requirements for fabric used to re-cover an aircraft?

Answer— The fabric must be of at least the quality and strength of the fabric used by the original manufacturer.

3. What two types of organic fibers are used for covering aircraft?

Answer— Cotton and linen.

4. What is meant by warp, weft, and bias?

Answer— Warp is the direction along the length of the fabric, weft is the direction across the fabric at right angles to the warp, and bias is a direction at a 45 degree angle to the warp and weft.

5. What is the purpose of the selvage edge on a roll of fabric?

Answer— It prevents the fabric from unraveling.

6. What identification marking is found on the selvage edge, and in which direction is the warp applied?

Answer— The FAA-PMA stamp is found on the selvage edge and the warp is applied parallel to the line of flight.

7. How are the fabric type and strength requirements determined for fabric-covered aircraft?

Answer— The original manufacturer determines the fabric type, and the strength requirements are a function of the never-exceed speed and wing loading.

8. What types of synthetic fibers are used for covering aircraft?

Answer— Fiberglass and heat-shrinkable polyester fibers.

9. Which of the several types of fabric is unaffected by moisture and mildew?

Answer– Fiberglass

10. What is the function or purpose of reinforcing tape?

Answer– Reinforcing tape is used between the fabric and the rib stitching to prevent the lacing cord from cutting through the fabric.

11. Where would you use surface tape?

Answer– Over rib stitching and sewed seams, overlapped edges, around corners, and along leading and trailing edges.

12. How should the edges of drainage, inspection, and ventilation holes be reinforced?

Answer– With plastic, aluminium, or brass grommets.

13. What are the principle methods used to test the condition of fabric?

Answer– Punch testers such as the Maule or Seybolt tester, and laboratory pull-testing.

14. Fabric is considered unairworthy when it has deteriorated to what percentage of its original strength?

Answer– Less than 70%.

15. How should a structure that will be covered with doped fabric be prepared following inspection and prior to covering?

Answer– Treat it with a protective coating of paint or varnish as appropriate.

16. What is the principal advantage of the envelope method for covering wings ?

Answer– Almost all the seams are machine-sewed by the envelope supplier.

17. What is a tie-off knot ?

Answer– A standard, modified seine knot used on all stitches except the starting stitch.

18. Name three common types of machine-sewed seams.

Answer– Plain overlap, folded-fell, and French-fell.

19. Where are anti-tear strips used ?

Answer– Under wing rib stitching when the never-exceed speed is greater than 250 mph.

20. How would you determine the correct spacing for rib stitching if the original spacing was unknown?

Answer– Consult the chart in AC 43.13-1B.

## AIRCRAFT PAINTING AND FINISHING

- If registration numbers are to be applied to an aircraft with a letter height of 12 inches, what is the minimum space required for the registration mark N1683C?  
 $\frac{2}{3} \times \text{height} = \text{character width.}$   
 $\frac{1}{6} \times \text{height} = \text{width for 1.}$   
 $\frac{1}{4} \times \frac{2}{3} \text{ height} = \text{spacing.}$   
 $\frac{1}{6} \times \text{height} = \text{stroke or line width.}$ 
  - 48 inches.
  - 52 inches.\*
  - 57 inches.
- If masking tape is applied to an aircraft such as for trim spraying, and is left on for several days and/or exposed to heat, it is likely that the tape will
  - cure to the finish and be very difficult to remove\*.
  - not seal out the finishing material if the delay or heating occurs before spraying.
  - be weakened in its ability to adhere to the surface.
- What is used to slow the drying time of some finishes and to prevent blush?
  - Reducer.
  - Retarder.\*
  - Rejuvenator.
- Which type of coating typically includes phosphoric acid as one of its components at the time of application?
  - Wash primer.\*
  - Epoxy primer.
  - Zinc chromate primer.
- Which properly applied finish topcoat is the most durable and chemical resistant?
  - Synthetic enamel.
  - Polyurethane.\*
  - Acrylic lacquer.
- Aluminum-pigment in dope is used primarily to
  - exclude sunlight from the fabric.\*
  - aid in sealing out moisture from the fabric.
  - provide a silver color.
- A correct use for acetone is to
  - thin zinc chromate primer.
  - thin dope.
  - remove grease from fabric.\*
- Which of the following is a hazard associated with sanding on fabric covered surfaces during the finishing process?
  - Overheating of the fabric/finish, especially with the use of power tools.
  - Static electricity buildup.\*
  - Embedding of particles in the finish.

9. What is likely to occur if unhydrated wash primer is applied to unpainted aluminum and then about 30 to 40 minutes later a finish topcoat, when the humidity is low?
- A dull finish due to the topcoat "sinking in" to primer that is still too soft.
  - Corrosion.\*
  - A glossy, blush-free finish.
10. Fungicidal dopes are used in aircraft finishing as the
- final, full-bodied, brushed-on coat to reduce blushing.
  - first coat to prevent fabric rotting and are applied thin enough to saturate the fabric.\*
  - first, full-bodied, brushed-on coat to prevent fungus damage.
11. Before spraying any finishing materials on unpainted clean aluminum.
- wipe the surface with avgas or kerosene.
  - avoid touching the surface with bare hands.\*
  - remove any conversion coating film.
12. What is likely to occur if hydrated wash primer is applied to unpainted aluminum and then about 30 to 40 minutes later a finish topcoat, when the humidity is low?
- A glossy, blush-free finish.\*
  - A dull finish due to the topcoat "sinking in" to primer that is still too soft.
  - Corrosion.
13. What is the usual cause of runs and sags in aircraft finishes?
- Low atmospheric humidity.
  - Too much material applied in one coat.\*
  - Material is being applied too fast.
14. Which defect in aircraft finishes may be caused by adverse humidity, drafts, or sudden changes in temperature?
- Orange peel.
  - Pinholes.
  - Blushing.\*
15. Which statement is true regarding paint system compatibility?
- Acrylic nitrocellulose lacquers may be used over old nitrocellulose finishes.
  - Old type zinc chromate primer may not be used directly for touchup of bare metal surfaces.
  - Old wash primer coats may be overcoated directly with epoxy finishes.\*
2. What are the two types of dope used for fabric finishes?
- Answer– Cellulose Nitrate and Cellulose Acetate Butyrate.
3. What is the appearance of a blushing paint finish?
- Answer– Chalky or cloudy.
4. What finishing defect is the result of a paint room temperature that is too warm?
- Answer– Pinholes or blisters.
5. What causes dope to blush?
- Answer– High humidity, moisture in the spray system, or application over a damp surface.
6. What factors cause spray paint sags and runs?
- Answer– Inadequate surface preparation or paint sprayed on too thickly.
7. What components or parts of the airframe must be protected from damage when using paint stripper?
- Answer– Windshields and window, plastics, composites, synthetic rubber, and fabrics.
8. What is the function of zinc-chromate or wash primers?
- Answer – Primers serve to inhibit corrosion and provide a good bond between the metal and the topcoats.
9. Name several common types of paint used on aircraft.
- Answer – Zinc-chromate and wash primers, synthetic enamels, acrylic lacquer, and polyurethane.
10. What is the proper thinner to use with zinc-chromate primer?
- Answer – Toluene
11. What health and safety precautions must be observed when using the toxic solvents and thinner that are part of modern finishing systems?
- Answer – Respirators and/or masks must be worn when spraying finishes.
12. If spray painting dust causes a surface to appear dry and rough, what are the most likely causes?
- Answer – Too much air pressure or the spray gun is too far from the surface being painted.

### QUESTIONS AND ANSWERS

1. Why is butyrate dope safer to use than nitrate dope?
- Answer– It is much less flammable.

13. What causes “orange-peel”?
- Answer – Spray pressure too high, use of a thinner that dries too fast, cold temperatures, or a damp draft over the surface.
14. What regulation governs the application of the registration number to aircraft registered in the United States?
- Answer – FAR Part 45
15. Other than appearance, what is another reason for touching up painted surfaces?
- Answer – Reduction or elimination of general corrosion problems.
16. What references should be used to determine if a control surface must be checked and/or rebalanced after painting?
17. What should be the effect if dops was used over paint or enamel?
- Answer – The dope tends to dissolve these materials.
18. What are the three most commonly used methods of applying paint?
- Answer – Dipping, brushing, and spraying.
19. What is the effect on paint finishes if too much drier is added to the paint?
- Answer – The paint film will be brittle and tend to crack and peel.
20. What paint system(s) may be used with epoxy topcoats?
- Answer – Any paint system in good condition.
3. Electric wire terminals for most aircraft applications must be of what type?
- Ring.\*
  - Hook.
  - Slotted.
4. What is the principal advantage of the series wound dc motor?
- Suitable for constant speed use.
  - High starting torque.\*
  - Low starting torque.
5. If a generator is equipped with a vibrator type voltage regulator, the actual time the voltage regulator points remain open
- is controlled by the reverse current cutout relay point clearance.
  - depends on the load carried by the generator.\*
  - is increased when the external load is greater than the generator output.
6. What is a cause of generator brush arcing?
- Low spring tension.\*
  - Carbon dust particles.
  - Seating brushes with No. 000 sandpaper.
7. When ac generators are operated in parallel, the
- amperes and voltage must both be equal.
  - amperes and frequency must both be equal.
  - frequency and voltage must both be equal.\*
8. The starting current of a series wound dc motor, in passing through both the field and armature windings, produces a
- low starting torque.
  - speed slightly higher when unloaded.
  - high starting torque.\*
9. Which motor would be most likely to have an armature brake?
- Inverter drive motor.
  - Starter motor.
  - Landing gear retraction motor.\*
10. The method most often used in overcoming the effect of armature reaction is through the use of
- drum wound armature in combination with a negatively connected series field.
  - interpoles.\*
  - shaded poles.
11. The only practical method of maintaining a constant voltage output from an aircraft generator under varying conditions of speed and load is to vary the
- strength of the magnetic field.\*
  - number of conductors in the armature.
  - speed at which the armature rotates.
12. The pole pieces or shoes used in a dc generator are a part of the
- armature assembly.
  - field assembly.\*
  - brush assembly.

## AIRFRAME/ELECTRICAL SYSTEMS

- Some electric motors have two sets of field windings wound in opposite directions so that the
  - speed of the motor can be more closely controlled.
  - motor can be operated in either direction.\*
  - power output of the motor can be more closely controlled.
- One purpose of a growler test is to determine the presence of
  - an out of round commutator.
  - a broken field lead.
  - a shorted armature.\*

13. How many cycles of ac voltage are produced in a six pole alternator of the revolving field type for each revolution of the rotor?
  - a. Six
  - b. Four.
  - c. Three.\*
14. If the reverse current cutout relay contact points fail to open after the generator output has dropped below battery potential, current will flow through the generator armature
  - a. opposite the normal direction and through the shunt \*
  - b. in the normal direction and through the shunt field opposite the normal direction.
  - c. and the shunt field opposite the normal direction.
15. How does the magnetic brake used to stop rotation of an electric motor armature operate?
  - a. A friction brake is applied by a spring and released by a magnet.\*
  - b. A friction brake is applied by a magnet and released by a spring.
  - c. Centrifugal force releases a rotating brake cog from a stationary notch when the armature reaches a certain speed and magnetic force re engages the cog when the electrical power is turned off.
16. In a generator, what eliminates any possible sparking to the brush guides caused by the movement of the brushes within the holder?
  - a. Brush spring tension.
  - b. The brush pigtail.\*
  - c. Undercutting the mica on the commutator.
17. A series wound dc electric motor will normally require
  - a. more current at high RPM than at low RPM.
  - b. approximately the same current throughout its operating range of speed.
  - c. more current at low RPM than at high RPM.\*
18. The type of electric wire terminals used for most aircraft applications, in addition to providing good current carrying capabilities, are designed primarily
  - a. to prevent circuit failure due to terminal disconnection.\*
  - b. for permanent connection to the circuit.
  - c. for uncomplicated and rapid circuit connection and disconnection.
19. Aluminum wire must be stripped very carefully because
  - a. high resistance will develop in stripping nicks.
  - b. stripping nicks can cause short circuits.
  - c. individual strands will break easily after being nicked.\*
20. The commutator of a generator.
  - a. changes direct current produced in the armature into alternating current as it is taken from the armature.
  - b. changes alternating current produced in the armature into direct current as it is taken from the armature into direct current as it is taken from the armature.\*
  - c. reverses the current in the field coils at the proper time in order to produce direct current.
21. An ammeter in a battery charging system is for the purpose of indicating the
  - a. rate of current used to charge the battery.\*
  - b. amperage available for use.
  - c. total amperes being used in the airplane.
22. Which of the following is not one of the purpose of interpoles in a generator?
  - a. Reduce arcing at the brushes.
  - b. Reduce field strength.\*
  - c. Overcome armature reaction.
23. To test generator or motor armature windings for opens,
  - a. check adjacent segments on commutator with an ohmmeter on the high resistance scale.
  - b. use a 12/24V test light between the armature core segments and the shaft.
  - c. place armature in a growler and connect a 110V test light on adjacent segments; light should turn on.\*
24. What is the color and orientation of the position lights for navigation on civil airplanes?
  - a. Left side - white, right side - green, rear aft - red.
  - b. Left side - red, right side - green, rear aft - white.\*
  - c. Left side - green, right side - red, rear aft - white.
25. To what depth is the mica insulation between the commutator bars of a dc generator undercut?
  - a. Equal to twice the width of the mica.
  - b. Equal to the width of the mica.\*
  - c. One half the width of the mica.
26. A voltage regulator controls generator output by
  - a. introducing a resistance in generator-to-battery lead in the event of overload.
  - b. shorting out field coil in the event of overload.
  - c. varying current flow to generator field coil.\*
27. Which type of dc generator is not used as an airplane generator?
  - a. Compound wound.
  - b. Externally grounded.
  - c. Series wound.\*

28. What is the most accurate type of frequency measuring instrument?
- Electrodynamometers using electromagnetic fields.
  - Integrated circuit chip having a clock circuit.\*
  - Electromagnets using one permanent magnet.
29. During ground operation, aircraft generator cooling is usually accomplished by
- auxiliary air cooled through an air/fuel heat exchanger.
  - an integral fan.\*
  - an external motor-driven fan.
30. What does a rectifier do?
- Changes direct current into alternating current.
  - Reduces voltage.
  - Changes alternating current into direct current.\*
31. What type of instrument is used for measuring very high values of resistance?
- Shunt type ohmmeter.
  - Multimeter.
  - Megohmmeter.\*
32. When a diode is checked for an open circuit or a short circuit, it should be
- checked with a milliamp ammeter.
  - checked in the circuit.
  - disconnected from the circuit.\*
33. When handling a high voltage capacitor in an electrical circuit, be sure it
- is fully discharged before removing it from the circuit.\*
  - has at least a residual charge before removing it from the circuit.
  - has a full charge before removing it from the circuit.
34. Which of the following is most likely to cause thermal runaway in a nickel-cadmium battery?
- Constant current charging of the battery to more than 100 percent of its capacity.
  - A high internal resistance condition.
  - Excessive current draw from the battery.\*
35. How can it be determined if a transformer winding has some of its turns shorted together?
- The output voltage will be high.
  - The transformer will get hot in normal operation.\*
  - Measure the input voltage with an ohmmeter.
36. Which of the following are the major parts of a dc motor?
- Armature assembly.
  - Field assembly.
  - Brush assembly.
  - Commutator.
  - Pole piece.
  - Rheostat.
  - End frame.
- 2, 3, 4, 5.
  - 3, 5, 6, 7.
37. (1) There are three basic types of dc motors; series, shunt, and compound.  
(2) In the series motor, the field windings, consisting of relatively few turns of heavy wire, are connected in series with the armature winding. Regarding the above statements,
- only No. 2 is true.
  - both No. 1 and No. 2 are true.\*
  - only No. 1 is true.
38. The voltage output of an alternator may be regulated by controlling the
- voltage output of the dc exciter.\*
  - speed of the alternator.
  - resistance in the rotor windings.
39. When adding a rheostat to a light circuit to control the light intensity, it should be connected in
- parallel with the light.
  - series parallel with the light switch.
  - series with the light.\*
40. Circuits that must be operated only in an emergency or whose inadvertent activation could endanger a system frequently employ
- guarded switches.\*
  - push-pull-type circuit breakers only (no switches).
  - spring-loaded to off toggle or rocker switches.
41. If one switch is used to control all navigation lights, the lights are most likely connected
- parallel to each other and in series with the switch\*.
  - in series with each other and in series with the switch.
  - in series with each other and parallel to the switch.
42. Oil canning of the sides of aluminum or steel electrical junction boxes is considered to be
- normal operation in vibration prone areas.
  - acceptable operation.
  - a shorting hazard.\*
43. During inspection of the terminal strips of an aircraft electrical system, it should be determined that
- only plain nuts and lock washers have been used for terminal attachment to the studs.
  - only locknuts have been used for terminal attachment to the studs.
  - the terminal studs are anchored against rotation\*.
44. What protection to wires and cables does conduit provide when used in aircraft installations?
- Mechanical.\*
  - Structural.

- c. Electromagnetic.
45. Which of the following should be accomplished in the installation of aircraft wiring?
- Provide adequate slack in the wire bundle to compensate for large changes in temperature.
  - Locate the bundle above flammable fluid lines and securely clamp to structure.\*
  - Support the bundle to structure and/or solid fluid lines to prevent chafing damage.
46. If the (+) terminal of a voltmeter is connected to the (-) terminal of the source voltage and the (-) terminal of the meter is connected to the (+) terminal of the source voltage, the voltmeter will read
- correctly.
  - low voltage.
  - backwards.\*
47. When using the voltage drop method of checking circuit resistance, the
- input voltage must be maintained at a constant value.\*
  - output voltage must be maintained at a constant value.
  - input voltage must be varied.
48. The nominal rating of electrical switches refers to continuous
- current rating with the contacts closed.\*
  - current rating with the contacts open.
  - voltage rating with the contacts closed.
49. Aircraft electrical junction boxes located in a fire zone are usually constructed of
- stainless steel.\*
  - cadmium plated steel.
  - asbestos.
50. To help minimize radio interference a capacitor will largely eliminate a steady direct current if the capacitor is connected to the generator in
- parallel.\*
  - series.
  - series/parallel.
51. The primary considerations when selecting electric cable size are
- the voltage and amperage of the load it must carry.
  - the system voltage and cable length.
  - current carrying capacity and allowable voltage drop.\*
52. The navigation lights of some aircraft consist of a single circuit controlled by a single switch which has an On position and an OFF position, with no additional positions possible. This switch is referred to as a
- single pole, single throw (SPST), two position switch.\*
  - double pole, single throw (DPST), two position
  - single pole, double throw (SPDT), two position
- switch.
53. Electric circuits are protected from overheating by means of
- thermocouples.
  - shunts.
  - fuses.\*
54. In installations where the ammeter is in the generator or alternator lead, and the regulator system does not limit the maximum current that the generator or alternator can deliver, the ammeter can be redlined at what percent of the generator or alternator rating?
- 75.
  - 100.\*
  - 50.
55. What kind of switch should you install in a single wire circuit that requires the switch to be manually held in the ON position?
- Single pole, single throw (SPST), two position normally open (NO).\*
  - Single pole, single throw (SPST), single-position.
  - Single pole, double throw (SPDT), single position.
56. A circuit breaker is installed in an aircraft electrical system primarily to protect the
- circuit and should be located as close to the source as possible.\*
  - electrical unit in the circuit and should be located as close to the source as possible.
  - circuit and should be located as close to the unit as possible.
57. How should a voltmeter be connected?
- In series with the load.
  - In parallel with the load.\*
  - In series with the source.
58. A circuit protection device called a current limiter is essentially a slow-blow fuse and is designed to be used in
- starter-generator circuits.
  - heavy power circuits.\*
  - 400 cycle Ac circuits.
59. If it is necessary to use an electrical connector where it may be exposed to moisture, the mechanic should
- coat the connector with grease.
  - spray the connector with varnish or zinc chromate.
  - use a special moisture proof type.\*
60. The three kinds of circuit-protection devices used most commonly in aircraft circuits are
- circuit breakers, fuses, and current limiters.\*
  - circuit breakers, resistors, and current limiters.
  - circuit breakers, capacitors, and current limiter plug-ins mechanical reset types.

61. What is the voltage drop for a No.18 copper wire 50 feet long to carry 12.5 amperes, continuous operation? Use the formula.  
 $VD = RLA$   
 $VD =$  Voltage drop  
 $R =$  Resistance per ft = .00644  
 $L =$  Length of wire  
 $A =$  Amperes  
 a. 1/2V.  
 b. 1V.  
 c. 4V.\*
62. What is the purpose of the selection of derated switches for known continuous load current applications?  
 a. To calculate the voltage drop across the circuit.  
 b. To prevent short circuits in the motor field windings.  
 c. To obtain reasonable switch efficiency and service life.\*
63. What is the advantage of a current limiter?  
 a. It can be reset easily.  
 b. It breaks circuit quickly.  
 c. It will take overload for a short period.\*
64. In aircraft electrical systems, automatic reset circuit breakers  
 a. should not be used as circuit protective devices\*.  
 b. must be used in all circuits essential to safe operation of the aircraft.  
 c. are useful where only temporary overloads are normally encountered.
65. A certain switch is described as a single pole, double throw switch (SPDT). The throw of a switch indicates the number of  
 a. circuits each pole can complete through the switch.\*  
 b. terminals at which current can enter or leave the switch.  
 c. places at which the operating device (toggle, plunger, etc.) will come to rest and at the same time open or close a circuit.
66. When considering an alteration, the criteria upon which the selection of electric cable size should be based are  
 a. current carrying capacity and applied voltage.  
 b. current carrying capacity and allowable voltage drop.\*  
 c. applied voltage and allowable voltage drop.
67. What is an important factor in selecting aircraft fuses?  
 a. The voltage rating should be lower than the maximum circuit voltage.  
 b. The current exceeds a predetermined value.  
 c. Capacity matches the needs of the circuit.\*
68. The circuit breaker in the instrument lighting system protects the  
 a. wiring from too much current.\*  
 b. wiring from too much voltage.  
 c. lights from too much current.
69. One advantage of using ac electrical power in aircraft is  
 a. that ac electrical motors can be reversed while dc motors cannot.  
 b. that the effective voltage is 1.41 times the maximum instantaneous voltage; therefore, less power input is required.  
 c. greater ease in stepping the voltage up or down\*
70. Certain transport aircraft use ac electrical power for all normal operation and battery furnished dc electrical power for standby emergency use. In aircraft of this type that operate no dc generators, the batteries are kept charged by  
 a. rectifiers which use the aircraft's ac generators as a source of power.\*  
 b. alternators which use the aircraft's generators as a source of power.  
 c. inverters which use the aircraft's ac generators as a source of power.
71. The voltage in an ac transformer secondary that contains twice as many loops as the primary will be  
 a. greater and the average less than in the primary\*.  
 b. less and the amperage greater than in the primary.  
 c. greater and the amperage greater than in the primary.
72. If the positive field lead between a generator and a generator control panel breaks and is shorted while the engine is running, a voltmeter connected to generator output would indicate  
 a. normal voltage.  
 b. residual voltage.\*  
 c. zero voltage.
73. What is a method used for restoring generator field residual magnetism?  
 a. Energize the armature.  
 b. Flash the fields.\*  
 c. Reseat the brushes.
74. The major advantages of alternating current (AC) over direct current (DC) is the fact that its current and voltage can easily be increased for decreased  
 a. by means of a inverter.  
 b. by means of transformer.\*  
 c. by means of a rectifier.
75. Which of the following must be accomplished when installing an anticollision light?  
 a. Install a switch independent of the position light



- switch.\*
  - b. Connect the anticollision light to the aircraft position
  - c. Use shielded electrical cable to assure fail safe operation.
76. The inductor type inverter output voltage is controlled by the
- a. dc stator field current.\*
  - b. voltage regulator.
  - c. number of poles and the speed of the motor.
77. When using an ohmmeter to check the continuity of a generator field coil, the coil should
- a. show very low resistance if it is a series field coil.\*
  - b. be removed from the generator housing.
  - c. show high resistance when the meter prods are connected to the terminals of the coil.
78. The strength of the core of an electromagnet depends upon the material from which it is constructed and which of the following?
- a. The size (cross section) and the number of turns of wire in the coil and the applied voltage.
  - b. The number of turns of wire in the coil and the applied voltage.
  - c. The number of turns of wire in the coil and the amount of current (amperes) passing through the coil.\*
79. A voltage regulator controls generator voltage by changing the
- a. current in the generator output circuit.
  - b. resistance of the generator field circuit.\*
  - c. resistance in the generator output circuit.
80. The overvoltage control automatically protects the generator system when excessive voltage is present by
- a. opening and resetting the field control relay.
  - b. breaking a circuit to the trip coil of the field control relay.
  - c. opening the shunt field circuit.\*
81. When dc generators are operated in parallel to supply power for a single load, their controls include an equalizer circuit to assure that all generators share the load equally. The equalizer circuit operates by
- a. decreasing the output of the high generator to equal the output of the low generator.
  - b. increasing the output of the low generator and decreasing the output of the high generator until they are equal.\*
  - c. increasing the output of the low generator to equal the output of the high generator.
82. What is the maximum amount of time a circuit can be in operation and still be an intermittent duty circuit?
- a. Two minutes.\*
  - b. One minute.
  - c. Three minutes.
83. The most common method of regulating the voltage output of a compound dc generator is to vary the
- a. current flowing through the shunt field coils.\*
  - b. resistance of the series field circuit.
  - c. total effective field strength by changing the reluctance of the magnetic circuit.
84. (Refer to figure 9.29) Which of the batteries are connected together incorrectly?
- a. 3.\*
  - b. 1.
  - c. 2.

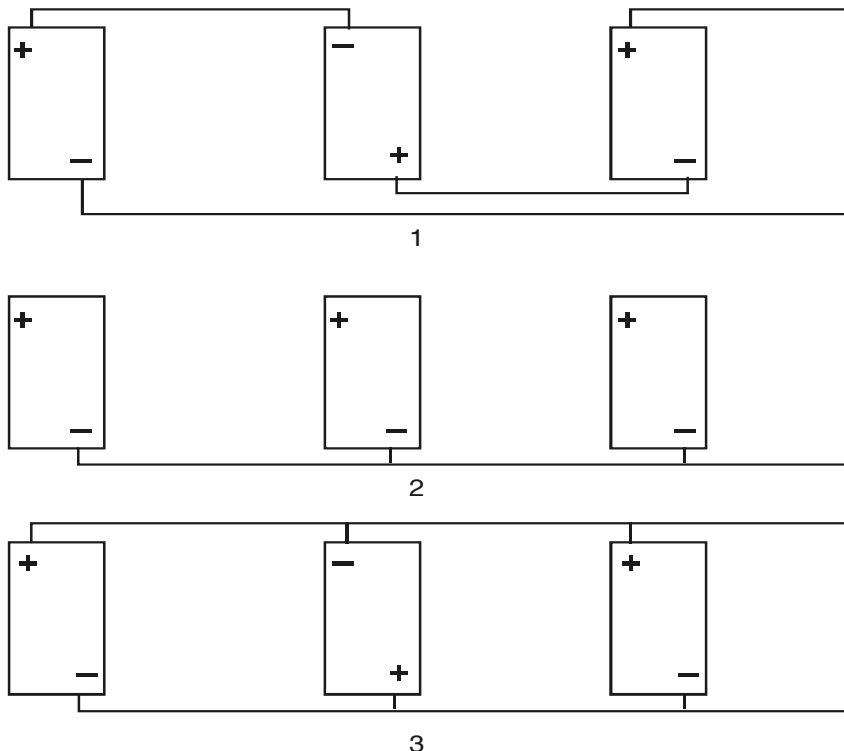


Figure 9.29.

85. (Refer to figure 9.30) Upon completion of the landing gear extension cycle, the green light illuminated and the red light remained lit. What is the probable cause?
- Short in the up limit switch.\*
  - Short in the gear safety switch.
  - Short in the down limit switch.
89. During inspection of an anticollision light installation for condition and proper operation, it should be determined that
- electrical or mechanical interconnections are provided so that the anticollision light will operate at all times that the position light switch is in the ON position.

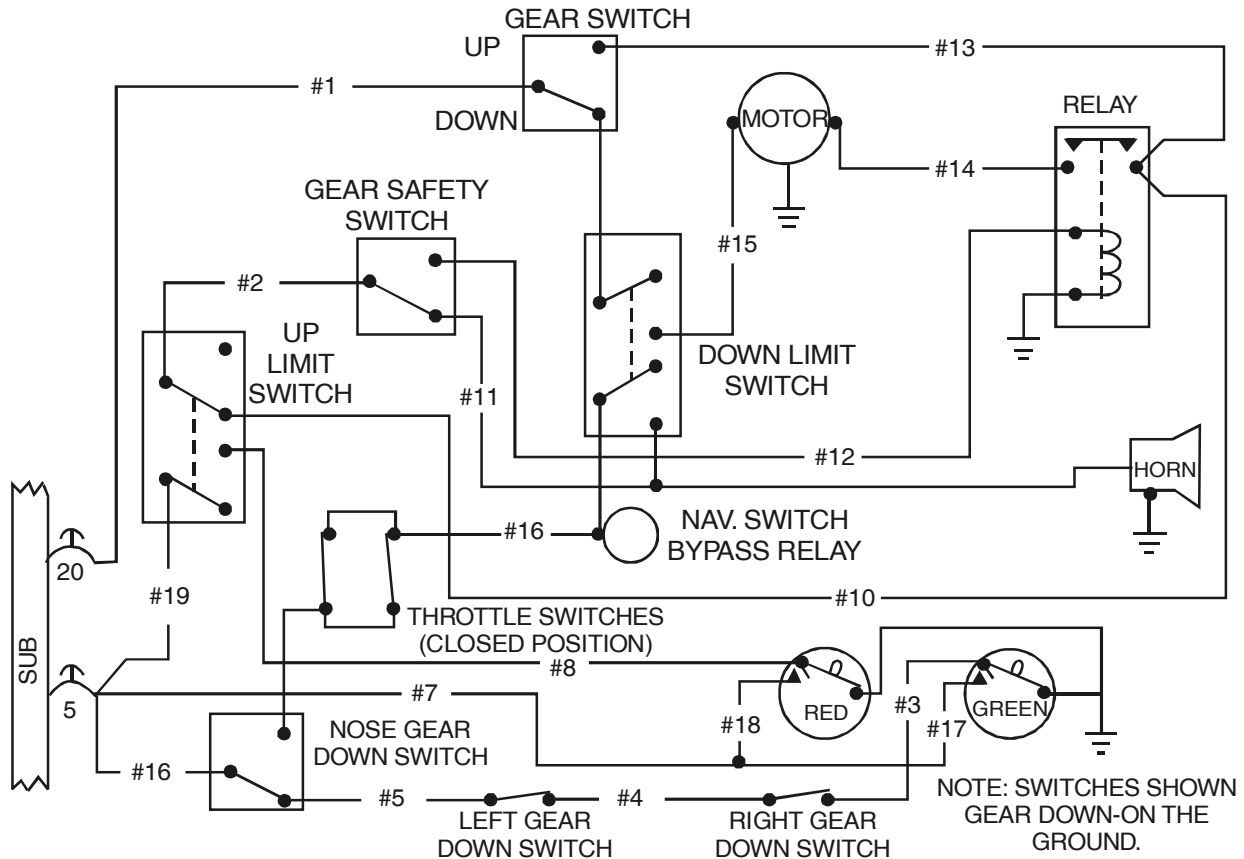


Figure 9.30.

86. If any one generator in a 24-volt dc system shows low voltage, the most likely cause is
- a defective reverse current cutout relay.
  - shorted or grounded wiring.
  - an out of adjustment voltage regulator.\*
87. How can be direction of rotation of a dc electric motor be changed?
- Interchange the wires which connect the motor to the external power source.
  - Reverse the electrical connections to either the field or armature windings.\*
  - Rotate the positive brush one commutator segment.
88. Aircraft which operate only ac generators (alternators) as a primary source of electrical power normally provide current suitable for battery charging through the use of
- a stepdown transformer and a rectifier.\*
  - a dynamotor with a half wave dc output.
  - an inverter and a voltage dropping resistor.
90. Major adjustments on equipment such as regulators, conductors, and inverters are best accomplished outside that airplane on test benches with necessary instruments and equipment. Adjustment procedure should be as outlined by
- the equipment manufacturer.\*
  - aircraft technical orders.
  - the FAA.
91. A battery generator system provides direct current. On installations requiring alternating current from the battery generator system, it is necessary to have
- a variable resistor between the battery and generator.
  - a transformer.
  - an inverter.\*

92. A relay is  
 a. a magnetically operated switch.\*  
 b. any conductor which receives electrical energy and passes it on with little or no resistance.  
 c. a device which converts electrical energy to kinetic energy.
93. The purpose of a rectifier in an electrical system is to change  
 a. direct current to alternating current.  
 b. alternating current to direct current.\*  
 c. the frequency of alternating current.
94. What is the ratio of turns between the primary coil winding and the secondary coil winding of a transformer designed to triple its input voltage?  
 a. Primary will have twice as many turns as its secondary.  
 b. Primary will have one third as many turns as its secondary.\*  
 c. Primary will have three times as many turns as its secondary.
95. In an ac circuit with no phase lead or lag, which is true?  
 a. Real power is greater than apparent power.  
 b. Real power is zero.  
 c. Real power equals apparent power.\*
96. How are generators rated?  
 a. Amperes at rated voltage.\*  
 b. Watts at rated voltage.  
 c. The impedance at rated voltage.
97. How is a shunt wound dc generator connected?  
 a. One field is shunted across the other.  
 b. The field and armature are shunted with a capacitor.  
 c. Both fields are shunted across the armature.\*
98. The poles of a generator are laminated to  
 a. increase flux concentration.  
 b. reduce flux losses.  
 c. reduce eddy current losses.\*
99. What is the frequency of an alternator dependent upon?  
 a. RPM.\*                      b. Voltage.  
 c. Current.
100. The generator rating is usually found stamped on the  
 a. engine.  
 b. firewall.  
 c. generator.\*
101. Residual voltage is a result of magnetism in the  
 a. field shoes.\*  
 b. armature.  
 c. field windings.
102. In troubleshooting an electrical circuit, if an ohmmeter is properly connected across a circuit component and some value of resistance is read,  
 a. either the component or the circuit is shorted.  
 b. the component has continuity and is not open.\*  
 c. the component has continuity and is open.
103. CSD driven generators are usually cooled by  
 a. both ram air and an integral fan.\*  
 b. an integral fan.  
 c. oil spray.
104. A CSD unit drives a generator through the use of  
 a. a variable hydraulic pump and hydraulic motor.\*  
 b. a synchronous electric motor.  
 c. an infinitely variable mechanical gearing system.
105. Integrated drive generators (IDG) employ a type of high output ac generator that utilizes  
 a. a brushless system to produce current.  
 b. brushes and slip rings to carry generated dc exciter current to the rotating field.\*  
 c. battery current to excite the field.
106. If the IDG scavenge oil filter is contaminated with chunks or pieces of metal  
 a. replace the oil and filter at 25 hour intervals.  
 b. change the oil at 25 hour intervals.  
 c. remove and replace the IDG.\*
107. When necessary during operation, CSD disconnect is usually accomplished by  
 a. a shear section in the input shaft.  
 b. a switch in the cockpit.\*  
 c. circuit breaker activation.
108. A CSD unit that is disconnected in flight, due to a malfunction such as over temperature, may be reconnected  
 a. manually by the flightcrew.  
 b. automatically if the temperature falls back into the normal operating range.  
 c. only on the ground by maintenance personnel.\*

### QUESTIONS AND ANSWERS

1. What could cause an AC electric motor to run too fast?  
 Answer – Excessive applied voltage or shorted field windings.
2. What tool is used to check a motor or generator armature for shorts and opens under load conditions?  
 Answer – A Growler.
3. When using a Growler, what indication will occur when a short exists between an armature segment?  
 Answer – When a metal blade is held over the armature and a short exists in a segment, the blade will begin to vibrate and “chatter.”

4. How is the output voltage of an alternator controlled?  
Answer – By varying the field current that excites the alternator.
5. What instruments are used to monitor electrical system loads?  
Answer – Ammeters and voltmeters.
6. How would you identify a specific wire in a wire bundle?  
Answer – By the identification code marked on the wire.
7. What tool would you use to determine the size of an unmarked wire?  
Answer – A wire gauge.
8. What color are the navigation lights on the wingtips?  
Answer – The left wingtip is red, the right is green.
9. Name several types of electrical devices that would be considered intermittent loads on an electrical system.  
Answer – Landing gear, cowl and wing flap motors, radio transmitters.
10. Why would it be necessary to analyze an electrical system before increasing the load on the system?  
Answer – To determine that the generator capacity, wire, size, and protective device capacity will not be exceeded.
11. What factors should be considered when determining the wire size for a particular application?  
Answer – The system voltage, permissible voltage drop, current to be carried, wire length and whether the load is continuous or intermittent.
12. What is the relationship between the inside diameter of a conduit and the outside diameter of the wire bundle inside it?  
Answer – The conduit must be 25% larger than the wire bundle.
13. What is the maximum number of terminal lugs that can be placed on a single terminal strip stud?  
Answer – Four
14. What is the proper length for a bonding jumper?  
Answer – As short as practical, but long enough to allow free movement of the component.
15. Under what conditions must a switch be derated from its nominal rating?  
Answer – When used with inductive circuits, circuits with high in-rush current, and with DC motors.
16. At what point do electric motors draw the most current?  
Answer – When starting.
17. Circuit breakers are designed to open before what condition occurs?  
Answer – Before the wire emits smoke.
18. At what point in a circuit should the protective device be located?  
Answer – As close to the power source as possible.
19. What type of circuit breaker may not be used in an aircraft?  
Answer – An automatic resetting type.
20. What part of an aircraft is identified by a white navigation light?  
Answer – The tail.
21. What could cause an AC electric motor to run too slowly?  
Answer – Lack of lubrication, defective wiring, or low applied voltage.
22. What should be done when making bonding or grounding connections between dissimilar materials?  
Answer – Use a suitable washer so that any corrosion will occur on the washer.
23. Prior to making a continuity check, what must be done to an electrical circuit?  
Answer – The power must be turned off.

## HYDRAULIC & PNEUMATIC POWER SYSTEM

1. What device in a hydraulic system with a constant delivery pump allows circulation of the fluid when no demands are on the system?
  - a. Pressure regulator.\*
  - b. Pressure relief valve.
  - c. Shuttle valve.
2. A fully charged hydraulic accumulator provides
  - a. positive fluid flow to the pump inlet.
  - b. a source for additional hydraulic power when heavy demands are placed on the system\*.
  - c. air pressure to the various hydraulic components.
3. A hydraulic system referred to as a "power pack" system will
  - a. have an engine driven pump for greater pressure.
  - b. have all hydraulic power components located in one unit.\*
  - c. have a pressurized reservoir.
4. A hydraulic hose identified as MIL-H-8794 will have a yellow stripe running the length of the hose. This stripe
  - a. identifies that the hose is constructed of synthetic rubber and may be suitable for a wide range of applications
  - b. identifies that the hose is for hydraulic fluid only.
  - c. is used to ensure that the hose is installed without excessive twisting.\*
5. An O ring intended for use in a hydraulic system using MIL-H-5606 (mineral base) fluid will be marked with
  - a. one or more white dots.
  - b. a blue stripe or dot.\*
  - c. a white and yellow stripe.
6. What condition would most likely cause excessive fluctuation of the pressure gauge when the hydraulic pump is operating?
  - a. Inadequate supply of fluid.\*
  - b. Accumulator air pressure low.
  - c. System relief valve sticking closed.
7. A filter incorporating specially treated cellulose paper is identified as a
  - a. sediment trap.
  - b. cuno filter.
  - c. micronic filter.\*
8. The purpose of an orifice check valve is to
  - a. restrict flow in one direction and allow free flow in the other.\*
  - b. relieve pressure to a sensitive component.
  - c. relieve pressure in one direction and prevent flow in the other direction.
9. To protect packing rings or seals from damage when it is necessary to instal them over or inside threaded sections, the
  - a. packings should be stretched during installation to avoid contact with the threads.
  - b. threaded section should be covered with a suitable sleeve.\*
  - c. threaded section should be coated with a heavy grease.
10. To prevent external and internal leakage in aircraft hydraulic units, the most commonly used type of seal is the
  - a. O ring seal.\*
  - b. gasket seal.
  - c. chevron seal.
11. Which allows free fluid flow in one direction and no fluid flow in the other direction?
  - a. Check valve.\*
  - b. Metering piston.
  - c. Shutoff valve.
12. Select the valve used in a hydraulic system that directs pressurized fluid to one end of an actuating cylinder and simultaneously directs return fluid to the reservoir from the other end.
  - a. Sequence.
  - b. Shuttle.
  - c. Selector.\*
13. What function does the absolute pressure regulator perform in the pneumatic power system?
  - a. Regulates the compressor outlet air pressure to stabilize the system pressure.
  - b. Regulates the compressor inlet air to provide a stabilized source of air for the compressor.\*
  - c. Regulates the pneumatic system pressure to protect the moisture separator from internal explosion.
14. (1) Relief valves are used in pneumatic system as damage preventing units  
(2) Check valves are used in both hydraulic and pneumatic systems.  
Regarding the above statements,
  - a. only No. 1 is true.
  - b. neither No. 1 nor No. 2 is true.
  - c. both No. 1 and No. 2 are true.\*
15. One of the distinguishing characteristics of an open center selector valve used in hydraulic system is that
  - a. fluid flows through the valve in the OFF position\*.
  - b. a limited amount of fluid flows in one direction and no fluid flows in the opposite direction.
  - c. fluid flows in three directions in the ON position.
16. What type of packings should be used in hydraulic components to be installed in a system containing Skydrol?
  - a. AN packings made of neoprene.
  - b. Packing materials made for ester base fluids.\*
  - c. AN packings made of natural rubber.

17. Relief valves are used in pneumatic system
  - a. as damage preventing units.\*
  - b. for one direction flow control.
  - c. to reduce the rate of airflow.
18. An aircraft pneumatic system, which incorporates an engine driven multistage reciprocating compressor, also requires
  - a. a surge chamber.
  - b. an oil separator.
  - c. a moisture separator.\*
19. The removal of air from an aircraft hydraulic system is generally accomplished
  - a. through automatic bleed valves on individual components during system operation.
  - b. by allowing the system to remain inoperative for several hours.
  - c. by operating the various hydraulic components through several cycles.\*
20. Pneumatic systems utilize
  - a. return lines.
  - b. relief valves.\*
  - c. diluter valves.
21. The component in the hydraulic system that is used to direct the flow of fluid is the
  - a. check valve.
  - b. orifice check valve.
  - c. selector valve.\*
22. What type of selector valve is one of the most commonly used in hydraulic systems to provide for simultaneous flow of fluid into and out of a connected actuating unit?
  - a. Three port, four way valve.
  - b. Four port, closed center valve.\*
  - c. Two port, open center valve.
23. What is the purpose of using backup rings with O rings in hydraulic systems above 1,500 PSI?
  - a. Prevent high pressure from extruding the seal between the moving and stationary part.\*
  - b. Provide a seal between two parts of a unit which move in relation to each other.
  - c. Prevent internal and external leakage of all moving parts within a hydraulic system.
24. The purpose of the pressure regulator in a hydraulic system is to
  - a. prevent failure of components or rupture of hydraulic lines under excessive pressure.
  - b. regulate the amount of fluid flow to the actuating cylinders within the system.
  - c. maintain system operating pressure within a predetermined range and to unload the pump.\*
25. A flexible sealing element subject to motion is a
  - a. gasket.
  - b. compound.
  - c. packing.\*
26. Which characteristics apply to aircraft hydraulic systems?
  1. Minimum maintenance requirements.
  2. Lightweight.
  3. About 80 percent operating efficiency (20 percent loss due to fluid friction).
  4. Simple to inspect.
  - a. 1, 2, 3, 4.
  - b. 1, 2, 4.\*
  - c. 1, 3, 4.
27. If a rigid tube is too short for the flare to reach its seat before tightening, pulling it into place by tightening
  - a. may distort the flare.\*
  - b. is acceptable.
  - c. may distort the cone.
28. The installation of a new metal hydraulic line should be made with
  - a. a straight tube to withstand the shocks and vibration to which it will be subjected.
  - b. enough bends to allow the tube to expand and contract with temperature changes and to absorb vibration.\*
  - c. a straight tube to permit proper alignment of the fitting and thereby reduce fluid loss through leakage.
29. Extrusion of an O ring seal is prevented in a high pressure system by the use of a
  - a. backup ring on the side of the O ring next to the pressure.
  - b. U ring on the side of the O ring away from the pressure.
  - c. backup ring on the side of the O ring away from the pressure.\*
30. What is one advantage of piston type hydraulic motors over electric motors?
  - a. They work satisfactorily over a wider temperature range.
  - b. There is no fire hazard if the motor is stalled.\*
  - c. They are considerably quieter in operation.
31. Generally, the first step in removing an accumulator from an aircraft is to
  - a. drain the reservoir.
  - b. relieve system pressure.\*
  - c. discharge the preload.

32. (Refer to figure 9.31.) Which fitting is an AN flared tube fitting?  
 a. 1.\*  
 b. 3.  
 c. 2.
33. (Refer to figure 9.32.) Which illustration(s) show(s) the correct spiral for teflon backup rings?  
 a. 1 and 2.  
 b. 1 and 3.\*  
 c. 3.
34. If a hydraulic brake system uses neoprene rubber packing materials, the correct hydraulic fluid to service the system is  
 a. mineral base oil.\*  
 b. phosphate ester base oil.  
 c. vegetable base oil.
35. The internal resistance of a fluid which tends to prevent it from flowing is called  
 a. volatility.  
 b. viscosity.\*  
 c. acidity.

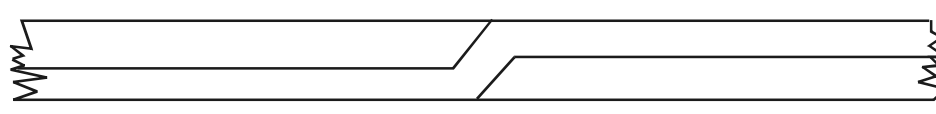
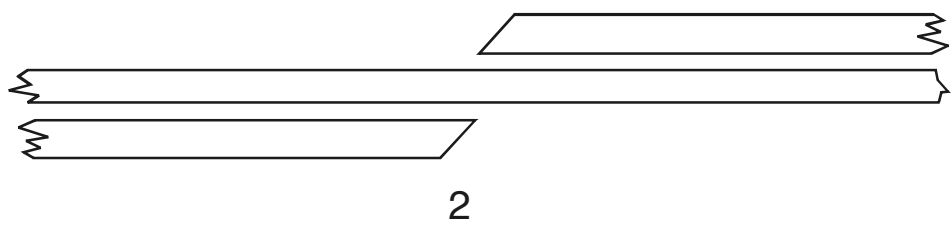
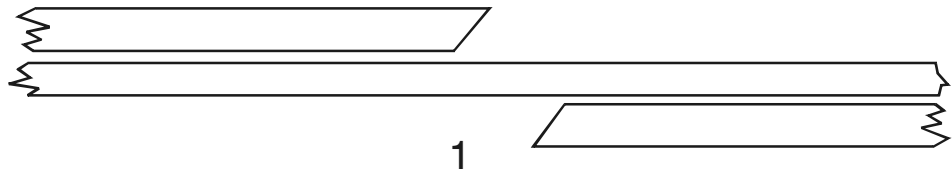
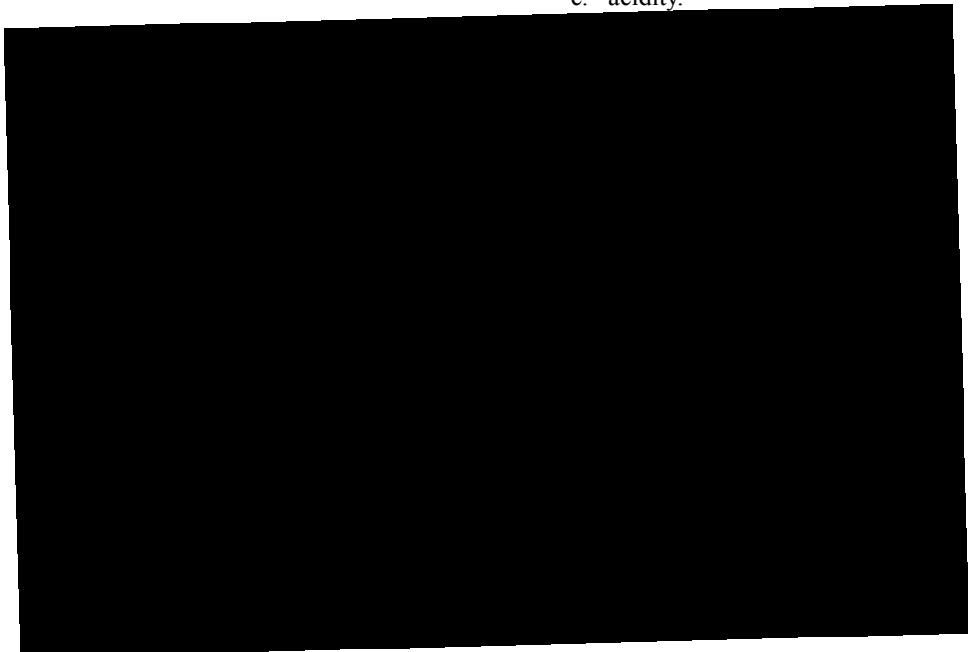


Figure 9.32.

36. What is the viscosity of hydraulic fluid?
- The internal resistance of a fluid which tends to prevent it from flowing.\*
  - The increase in volume of a fluid due to temperature change.
  - The fluid's ability to resist oxidation and deterioration for long periods.
37. Which is a characteristic of petroleum base hydraulic fluid?
- Nonflammable under all conditions.
  - Flammable under normal conditions.\*
  - Compatible to natural rubber seals and packings.
38. (1) When servicing aircraft hydraulic systems, use the type fluid specified in the aircraft manufacturer's maintenance manual or on the instruction plate affixed to the reservoir or unit.  
(2) Hydraulic fluids for aircraft are dyed a specific color for each type of fluid.  
Regarding the above statements,
- only No. 1 is true.
  - only No. 2 is true.
  - both No. 1 and No. 2 are true.\*
39. Petroleum base hydraulic fluid is which color?
- Purple.
  - Red.\*
  - Blue.
40. Which of the following is adversely affected by atmospheric humidity if left unprotected?
- MIL-H-5606 hydraulic fluid.
  - Skydrol hydraulic fluid.
  - None of the above.
- 2.\*
  - 1 and 2.
  - 3.
41. Which is a characteristic of synthetic base hydraulic fluid?
- Low flash point.
  - Low moisture retention.
  - High flash point.\*
42. Which statement about fluids is correct?
- All fluids are considered to be highly compressible.
  - Any fluid will completely fill its container.
  - All fluids readily transmit pressure.\*
43. Three types of hydraulic fluids currently being used in civil aircraft are
- mineral base, vegetable base, and phosphate ester base.\*
  - mineral base, phosphate ester base, and mixed mineral and phosphate ester base.
  - mineral base, phosphate ester base, and mixed vegetable and alcohol base.
44. Which of the following lists only desirable properties of a good hydraulic fluid?
- High viscosity, low flash point, chemical stability, high fire point.
  - Low viscosity, chemical stability, high flash point, high fire point.\*
  - High flash point, low viscosity, chemical stability, low fire point.
45. Characteristics of MIL-H-8446 (Skydrol 500 A & B) hydraulic fluid are
- blue colour, phosphate ester base, fire resistant, butyl rubber seals.
  - light purple colour, phosphate ester base, fire resistant, butyl rubber seals.\*
  - light green colour, phosphate ester base, fire resistant, butyl rubber seals.
46. Where can information be obtained about the compatibility of fire resistant hydraulic fluid with aircraft materials?
- Manufacturer's technical bulletins.\*
  - Aircraft manufacturer's specifications.
  - AC 43.13-1A.
47. Characteristics of MIL-H-5606 hydraulic fluid are
- light purple color, phosphate ester base, fire resistant, butyl rubber seals.
  - blue color, vegetable base, will burn, natural rubber seals.
  - red color, petroleum base, will burn, synthetic rubber seals.\*
48. Characteristics for MIL-H-7644 hydraulic fluid are
- blue color, vegetable base, will burn, natural rubber seals.\*
  - light purple color, phosphate ester base, fire resistant, butyl rubber seals.
  - red color, petroleum base, will burn, synthetic rubber seals.
49. If an aircraft hydraulic system requires mineral base hydraulic fluid, but phosphate ester base hydraulic fluid is used, what will be the effect on the system?
- System will be contaminated, fluids will not blend, and the seals will fail.\*
  - No effect.
  - System will be contaminated, fluids will not blend, but there will be no seal problem.
50. What is used to flush a system normally serviced with MIL-H-5606 hydraulic fluid?
- Naphtha or varsol.\*
  - Lacquer thinner or trichlorethylene.
  - Methyl ethyl ketone or kerosene.
51. Components containing phosphate ester-base hydraulic fluid may be cleaned with
- Naphtha.
  - Carbon tetrachloride.\*
  - Stoddard solvent.



52. How can the proper hydraulic fluid to be used in an airplane be determined?
- Consult the aircraft manufacturer's service manual\*
  - Refer to the aircraft parts manual.
  - Consult the aircraft Type Certificate Data Sheet.
53. Phosphate ester base hydraulic fluid is very susceptible to contamination from
- ethylene propylene elastomers.
  - teflon seal material.
  - water in the atmosphere.\*
54. (1) Materials which are Skydrol compatible or resistant include most common aircraft metals and polyurethane and epoxy paints.  
(2) Skydrol hydraulic fluid is compatible with nylon and natural fibers.  
Regarding the above statements.
- both No.1 and No. 2 are true.\*
  - only No. 1 is true.
  - neither No. 1 nor No. 2 is true.
55. The hydraulic component that automatically directs fluid from either the normal source or an emergency source to an actuating cylinder is called a
- bypass valve.
  - crossflow valve.
  - shuttle valve.\*
56. The primary purpose of a hydraulic actuating unit is to transform
- fluid pressure into useful work.\*
  - fluid motion into mechanical pressure and back again.
  - energy from one form to another.
57. The primary function of the flap overload valve is to
- boost normal system pressure to the flaps in order to overcome the air loads acting on the relatively large flap area.
  - prevent the flaps from being lowered at airspeeds which would impose excessive structural loads.\*
  - cause the flap segments located on opposite sides of the aircraft center line to extend and retract together so that the aircraft will not become aerodynamically unbalanced to the extent that it becomes uncontrollable.
58. A unit which transforms hydraulic pressure into linear motion is called.
- an accumulator.
  - an actuating cylinder.\*
  - a hydraulic pump.
59. If it is necessary to adjust several pressure regulating valves in a hydraulic system, what particular sequence, if any, should be followed?
- Units are independent of each other, and therefore, no particular sequence is necessary.
  - Units most distant from the hydraulic pump should be adjusted first.
  - Units with the highest pressure settings are adjusted first.\*
60. If an aircraft's constant pressure hydraulic system cycles more frequently than usual and no fluid leakage can be detected, the most probable cause is
- low accumulator air preload.\*
  - pump volume output too high.
  - a too high relief valve setting.
61. Unloading valves are used with many engine driven hydraulic pumps to
- dampen out pressure surges.
  - relieve system pressure.
  - relieve the pump pressure.\*
62. What safety device is usually located between the driving unit and hydraulic pump drive shaft/
- Thermal relief valve.
  - Pump motor safety switch.
  - Pump drive coupling shear section.\*
63. Which valve installed in a hydraulic system will have the highest pressure setting?
- Thermal relief valve.\*
  - Pressure regulator valve.
  - Main relief valve.
64. Excluding lines, which components are required to make up a simple hydraulic system?
- Pump, reservoir, relief valve and shuttle valve.
  - Actuator, pressure reservoir, accumulator, and selector valve.
  - Pump, reservoir, selector valve, and actuator.\*
65. Most variable displacement hydraulic pumps of current design
- contain a built in means of system pressure regulation.\*
  - must be driven at a nearly constant speed in order to be practical for use.
  - are not practical for use with a closed center hydraulic system.
66. In a gear type hydraulic pump, a mechanical safety device incorporated to protect the pump from overload is the
- check valve.
  - shear pin.\*
  - bypass valve.
67. After installation of a rebuilt hydraulic hand pump, it is found that the handle cannot be moved in the pumping direction (pressure stroke). The most likely cause is an incorrectly installed
- hand pump output check valve.\*
  - hand pump input check valve.
  - input/output orifice check valve.
68. Pressure is a term used to indicate the force per unit area. Pressure is usually expressed in
- pounds per inch.
  - pounds per square inch.\*
  - pounds per cubic inch.

69. If two actuating cylinders which have the same cross sectional area but different lengths of stroke are connected to the same source of hydraulic pressure, they will exert
- different amounts of force but will move at the same rate of speed.
  - equal amounts of force but will move at the same rate of speed.\*
  - equal amounts of force but will move at different rates of speed.
70. Using a hand pump, pressure of 100 PSI has been built up in a hydraulic system. The hand pump piston is 1 inch in diameter. A 1/2-inch line connects the hand pump to an actuating cylinder 2 inches in diameter. What is the pressure in the line between the hand pump and the actuator?
- 150 PSI.
  - 100 PSI.\*
  - 200 PSI.
71. Heat exchanger cooling units are required in some aircraft hydraulic systems because of
- fluid flammability.
  - the high heat generated from braking.
  - high pressures and high rates of fluid flow.\*
72. Which is true regarding the ground check of a flap operating mechanism which has just been installed?
- If the time required to operate the mechanism increases with successive operations, it indicates the air is being worked out of the system.
  - If the time required to operate the mechanism decreases with successive operations, it indicates the air is being worked out of the system.\*
  - All hydraulic lines and components should be checked for leaks by applying soapy water to all connections.
73. A hydraulic system operational check during ground runup of an aircraft indicates that the wing flaps cannot be lowered using the main hydraulic system, but can be lowered by using the emergency hand pump. Which is the most likely cause?
- The pressure accumulator is not supplying pressure to the system.
  - The fluid level in the reservoir is low.\*
  - The flap selector valve has a severe internal leak.
74. Many hydraulic reservoirs contain a small quantity of fluid which is not available to the main system pump. This fluid is retained to
- supply fluid to the auxiliary pump.\*
  - prime the main system.
  - supply fluid to the pressure accumulator.
75. The unit which causes one hydraulic operation to follow another in a definite order is called a
- selector valve.
  - shuttle valve.
  - sequence valve.\*
76. The purpose of a hydraulic pressure regulator is to
- prevent the system pressure from rising above a predetermined amount due to thermal expansion.
  - relieve the pump of its load when no actuating units are being operated.\*
  - boost the pressure in portions of the system.
77. Severe kickback of the emergency hydraulic hand pump handle during the normal intake stroke will indicate which of the following?
- The main system relief valve is set too high.
  - The hand pump input check valve is sticking open.
  - The hand pump output check valve is sticking open.\*
78. What type of valve in an aircraft hydraulic system permits fluid to flow freely in one direction, but restricts the rate at which fluid is allowed to flow in the other direction?
- Orifice check valve.\*
  - Orifice restrictor.
  - Check valve.
79. The main system pressure relief valve in a simple hydraulic system equipped with a power control valve should be adjusted.
- while one or more actuating units are in operation.
  - with the power control valve held in the CLOSED position.\*
  - with the power control valve in the OPEN position.
80. A hydraulic accumulator is charged with an air preload of 1,000 PSI. When a hydraulic system pressure of 3,000 PSI is developed, the pressure on the air side of the accumulator will be
- 4,000 PSI.
  - 3,000 PSI.\*
  - 1,000 PSI.
81. How is the air in a hydraulic accumulator prevented from entering the fluid system?
- By including a valve that automatically closes when the fluid level lowers to a preset amount.
  - By physically separating the air chamber from the oil chamber with a flexible or movable separator.\*
  - By forcing the oil/air mixture through a centrifugal separating chamber that prevents the air from leaving the accumulator.
82. After a hydraulic accumulator has been installed and air chamber charged, the main system hydraulic pressure gauge will not show a hydraulic pressure reading until
- the fluid side of the accumulator has been charged\*.
  - at least one selector valve has been actuated to allow fluid to flow into the fluid side of the accumulator.
  - the air pressure has become equal to the fluid pressure.

83. What must be done before adjusting the relief valve of a main hydraulic system incorporating a pressure regulator?
- Manually unseat all system check valves to allow unrestricted flow in both directions.
  - Adjust all other system relief valves which have a lower pressure setting.
  - Eliminate the action of the unloading valve.\*
84. Which seals are used with vegetable base hydraulic fluids?
- Natural rubber.\*
  - Butyl rubber.
  - Silicon rubber.
85. The air that is expended and no longer needed when an actuating unit is operated in a pneumatic system is
- returned to the compressor.
  - exhausted or dumped, usually overboard.\*
  - charged or pressurized for use during the next operating cycle.
86. Some hydraulic systems incorporate a device which is designed to remain open to allow a normal fluid flow in the line, but closed if the fluid flow increases above an established rate. This device is generally referred to as a
- hydraulic fuse.\*
  - metering check valve.
  - flow regulator.
87. When hydraulic system pressure control and relief units fail to function properly, how are most systems protected against overpressure?
- A shear section on the main hydraulic pump drive shaft.\*
  - One or more hydraulic fuses installed in the pressure and return lines.
  - A shuttle valve interconnecting the main and emergency systems.
88. A worn hydraulic pump shaft seal can normally be detected by
- hydraulic fluid flowing from the pump drain line.\*
  - the presence of hydraulic fluid around the pump mounting pad.
  - evidence of hydraulic fluid combined in the engine oil.
89. If an engine driven hydraulic pump of the correct capacity fails to maintain normal system pressure during the operation of cowl flap actuating unit, the probable cause is
- restriction in the pump outlet.\*
  - a partial restriction in the inport of the selector valve.
  - mechanical interference to the movement of the cowl flap.
90. Before removing the filler cap of a pressurized hydraulic reservoir,
- relieve the hydraulic system pressure.
  - relieve the air pressure.\*
  - actuate several components in the system.
91. What happens to the output of a constant displacement hydraulic pump when the hydraulic system pressure regulator diverts the fluid from the system to the reservoir?
- The output pressure and volume remain the same.
  - The output pressure reduces, but the volume remains the same.\*
  - The output pressure remains the same, but the volume reduces.
92. Hydraulic system accumulators serve which of the following functions?
- Dampen pressure surges.
  - Supplement the system pump when demand is beyond the pump's capacity.
  - Store power for limited operation of components if the pump is not operating.
  - Ensure a continuous supply of fluid to the pump.
- 1, 2, 3.\*
  - 2, 3.
  - 1, 2, 3, 4.
93. Chattering of the hydraulic pump during operation is an indication
- that air is entering the pump.\*
  - of low accumulator preload.
  - that the main system relief valve is sticking open.
94. Quick disconnect couplings in hydraulic systems provide a means of
- easily replacing hydraulic lines in areas where leaks are common.
  - quickly connecting and disconnecting hydraulic lines and eliminate the possibility of contaminants entering the system.
  - quickly connecting and disconnecting hydraulic lines without loss of fluid or entrance of air into the system.\*
95. Which seal/material is used with phosphate ester base hydraulic fluids?
- Silicon rubber.
  - Neoprene rubber.
  - Butyl rubber.\*
96. A hydraulic pump is a constant-displacement type if it
- produces an unregulated constant pressure.
  - produces a continuous positive pressure.
  - delivers a uniform rate of fluid flow.\*
97. A hydraulic motor converts fluid pressure to
- linear motion.
  - rotary motion.\*
  - angular motion.

98. A crossflow valve which is designed to bypass fluid from one side of an actuating cylinder to the other side, under certain conditions, may be found in some aircraft installed in the
- flap overload system.
  - landing gear system.\*
  - engine cowl flap system.
99. Hydraulic fluid filtering elements constructed of porous paper are normally
- discarded at regular intervals and replaced with new filtering elements.\*
  - not approved for use in certificated aircraft.
  - cleaned and reused.
100. A pilot reports that when the hydraulic pump is running, the pressure is normal. However, when the pump is stopped, no hydraulic pressure is available. This is an indication of a
- leaking selector valve.
  - low accumulator fluid preload.
  - leaking accumulator air valve.\*
101. If fluid is added to a nonpressurized reservoir in a constant pressure hydraulic system while the system is pressurized,
- fluid will spray violently out of the reservoir when the filler neck cap is removed.
  - the fluid level will increase when system pressure is reduced.\*
  - air will be drawn into the system, when the filler neck cap is removed, resulting in pump chattering and possible damage.
102. In a hydraulic system that has a reservoir pressurized with turbine engine compressor bleed air, which unit reduces the air pressure between the engine and reservoir?
- Air bleed relief valve.
  - Relief valve.
  - Air pressure regulator.\*
103. What is the main purpose of a pressurized reservoir in a hydraulic system?
- Prevent hydraulic pump cavitation.
  - Prevent hydraulic fluid from foaming.\*
  - Prevent tank collapse at altitude.
103. One of the main advantages of skydrol is it's
- wide operating temperature.\*
  - inability to mix with water.
  - high operating pressure.
104. Hydraulic fluid reservoirs are sometimes designed with a stand pipe in one of the outlet ports in order to assure emergency supply of fluid. The outlet port with the stand pipe in it furnishes fluid to the
- emergency pump when the fluid supply to the normal system has been depleted.
  - emergency pump at any time it is required.
  - normal system power pump.\*
105. An emergency supply of fluid is often retained in the main hydraulic system reservoir by the use of standpipe. The supply line is connected to the
- inlet of the emergency pump.
  - inlet of the main system pump.\*
  - inlet of the main hydraulic system.
106. To check the air charge in a hydraulic accumulator.
- read it directly from the auxiliary pressure gauge.
  - reduce all hydraulic pressure, then observe the reading on the accumulator air gauge.\*
  - observe the first reading on the hydraulic system gauge while operating a component in the system.
107. How would the air pressure charge in the accumulator be determined if the engine is inoperative, but the system still has hydraulic pressure?
- Operate a hydraulic unit slowly and note the pressure at which a rapid pressure drop begins as it goes toward zero.\*
  - Read it directly from the main system pressure gauge with all actuations inoperative.
  - Build up system pressure with the emergency pump and then read the pressure on a gauge attached to the air side of the accumulator.
108. How many of these seals are used with petroleum base hydraulic fluids?
- Synthetic rubber.
  - Natural rubber.
  - Neoprene rubber.
- Two.\*
  - One.
  - Three.
109. Hydraulic system thermal relief valves are set to open at a
- lower pressure than the system pressure regulator.
  - lower pressure than the system relief valve.
  - higher pressure than the system relief valve.\*
110. Chatter in a hydraulic system is caused by
- excessive system pressure.
  - air in the system.\*
  - insufficient system pressure.
111. If hydraulic fluid is released when the air valve core of the accumulator is depressed, it is evidence of
- a leaking check valve.
  - a ruptured diaphragm or leaking seals.\*
  - excessive accumulator air pressure.
112. Although dents in the heel of a bend are not permissible, they are acceptable in the remainder of a hydraulic tube providing they are less than what percent of the tube diameter?
- 10.\*
  - 20.
  - 5.

113. If the hydraulic system pressure is normal while the engine driven pump is running, but there is no pressure after the engine has been shut off, it indicates.
- no air pressure in the accumulator.\*
  - the system relief valve setting is too high
  - the pressure regulator is set too high.
114. The purpose of restrictors in hydraulic systems is to
- allow the flow of fluid in one direction only
  - control the rate of movement of hydraulically operated mechanisms.\*
  - lower the operating pressure of selected components.
115. A common cause of slow actuation of hydraulic components is
- restricted orifices.
  - internal leakage in the actuating unit.\*
  - cold fluid.
116. A loud hammering noise in a hydraulic system having an accumulator usually indicates
- too low or no preload in the accumulator.\*
  - too much preload in the accumulator.
  - air in the fluid.
117. Teflon hose that has developed a permanent set from being exposed to high pressure or temperature should
- not be straightened or bent further.\*
  - not be reinstalled once removed.
  - be immediately replaced.
118. In a typical high pressure pneumatic system, if the moisture separator does not vent accumulated water when the compressor shuts down, a likely cause is a
- malfunctioning pressure transmitter.
  - malfunctioning solenoid dump valve.\*
  - saturated chemical dryer.
4. Name several sources used to develop hydraulic pressure?
- Answer– Hand pumps, engine-driven pumps, and electrically driven pumps.
5. What would cause the bypass valve in a hydraulic filter to open and allow unfiltered fluid to circulate in the system?
- Answer– A clogged filter element.
6. Describe several methods of pressurizing a hydraulic reservoir.
- Answer– Engine bleed air, system pressure acting on a small piston in the reservoir, using variable-displacement hydraulic pumps.
7. What feature prevents engine damage if an engine-driven hydraulic pump seizes or is overloaded?
- Answer– A shear section in the pump drive shaft will break, disconnecting the pump from the engine.
8. Describe the purpose of a pressure relief valve.
- Answer– Pressure relief valves limit the maximum pressure produced by the pump, thereby preventing failures of the system components.
9. Engine-driven pumps deliver the output fluid flow in what two forms?
- Answer– As a constant volume or a variable volume.
10. Describe the operation of a gear-type pump?
- Answer– Two meshed gears, driven by a power source, rotate in a housing. Inlet fluid is carried around the outside of the gears and delivered to the outlet side as the gears rotate.

## HYDRAULIC AND PNEUMATIC POWER SYSTEMS

1. What materials form the bases of the three types of hydraulic fluids?
- Answer–Vegetable, mineral, and phosphate-esters.
2. What colors denotes mineral-based and phosphate-ester-based hydraulic fluids?
- Answer– Mineral based fluids are red and phosphate-ester based fluids are light purple.
3. What are the results of exposing lacquers, oil-based paint, plastic resins, and vinyl compounds to phosphate-ester-based hydraulic fluid?
- Answer– The materials will be damaged and/or softened, or the paint will peel.
11. Describe the purpose of a pressure regulator?
- Answer– Pressure regulators manage the output of the pump to maintain system pressure. They allow the pump to be unloaded so it runs without significant resistance.
12. What is the device that is used in some systems to supplement the pump output during periods of high demand?
- Answer– An accumulator.
13. What are the three different types of accumulators?
- Answer– Piston, diaphragm, and bladder.

14. What safety precautions must be taken prior to disassembling an accumulator?  
Answer– Release all of the air or preload.
15. When a hydraulic unit is replaced, what precautions should be taken to avoid contamination of the system?  
Answer– All lines should be capped or plugged immediately after they are disconnected.
16. What types of components or systems are pneumatically operated in some aircraft?  
Answer– Landing gear, brakes, flaps, and other mechanical actuators.
17. Name several sources of pneumatic power?  
Answer– Storage bottles, engine bleed air, engine-driven compressors or vane-type pumps.
18. What happens to excess pressure in a pneumatic system?  
Answer– A relief valve vents it over board.
19. What is the function of a restrictor in a pneumatic system?  
Answer– To control the rate of flow of the air.
20. What are the reasons for periodically purging a pneumatic system?  
Answer– To remove moisture and contaminants.
3. In brake service work, the term “bleeding brakes” is the process of  
a. replacing small amounts of fluid in reservoir.  
b. withdrawing air only from the system.  
c. withdrawing fluid from the system for the purpose of removing air that has entered the system.\*
4. To prevent a very rapid extension of an oleo shock strut after initial compression resulting from landing impact,  
a. various types of valves or orifices are used which restrict the reverse fluid flow.\*  
b. the air is forced through a restricted orifice in the reverse direction.  
c. the metering pin gradually reduces the size of the orifice as the shock strut extends.
5. A pilot reports the right brake on an aircraft is spongy when the brake pedal is depressed in a normal manner. The probable cause is  
a. the hydraulic master cylinder piston return spring is weak.  
b. air in the brake hydraulic system.\*  
c. the hydraulic master cylinder piston is sticking.
6. Aside from an external leak in the line, what will cause parking brakes to creep continually to the OFF position?  
a. Insufficient hydraulic fluid in the reservoir.  
b. Glazed brake linings.  
c. An internal leak in the master cylinder \*
7. Why do most aircraft tire manufactures recommend that the tubes in newly installed tires be first inflated, fully deflated, and then reinflated to the correct pressure?  
a. To eliminate all the air between the tube and the inside of the tire.  
b. To allow the tube to position itself correctly inside the tire.\*  
c. To test the entire assembly for leaks.

## AIRCRAFT LANDING GEAR SYSTEMS

1. Exposure to and/or storage near which of the following is considered harmful to aircraft tires ?  
1. Low humidity.  
2. Fuel.  
3. Oil.  
4. Ozone.  
5. Helium.  
6. Electrical equipment.  
7. Hydraulic fluid.  
8. Solvents.  
a. 1, 2, 3, 5, 7, 8.  
b. 2, 3, 4, 6, 7, 8. \*  
c. 2, 3, 4, 5, 6, 7, 8.
2. What would be the effect if the position return spring broke in a brake master cylinder?  
a. The brake travel would become excessive.  
b. The brakes would become spongy.  
c. The brakes would drag.\*
8. The metering pins in oleo shock struts serve to  
a. retard the flow of oil as the struts are compressed.\*  
b. meter the proper amount of air in the struts.  
c. lock the struts in the DOWN position.
9. After performing maintenance on an aircraft’s landing gear system which may have affected the system’s operation, it is usually necessary to  
a. make an operational check with the aircraft on jacks.\*  
b. re-inspect the area after the first flight.  
c. conduct a flight test.
10. Why do tire and wheel manufactures often recommend that the tires on split rim wheels be deflated before removing the wheel from the axle?  
a. To relieve the strain on the wheel retaining nut and axle threads.  
b. As a safety precaution in case the bolts that hold the wheel halves together have been damaged or weakened.\*  
c. To remove the static load imposed upon the wheel bearings by the inflated tire.

11. The braking action of a Cleveland disk brake is accomplished by compressing a rotating brake disk between two opposite brake linings. How is equal pressure on both sides of the rotating disk assured?
  - a. By allowing the brake rotor to float to automatically equalize as pressure is applied to the rotor.
  - b. By allowing the brake linings to automatically equalize as pressure is applied to the rotor.
  - c. By allowing the caliper to float to automatically equalize as pressure is applied to the rotor.\*
12. If it is determined that spongy brake action is not caused by air in the brake system, what is the next most likely cause?
  - a. Deteriorated flexible hoses.\*
  - b. Internal leakage in the master cylinder.
  - c. Worn brake lining.
13. Many brake types can be adapted to operate mechanically or hydraulically. Which type is not adaptable to mechanical operation?
  - a. Expander tube type.\*
  - b. Single disk spot type.
  - c. Single servo type.
14. A brake deboost valve is installed in systems where the high pressure of the hydraulic system (3000 psi) is used to operate brakes
  - a. that are used on aircraft having high landing speeds.
  - b. that are designed to work with lower pressure.\*
  - c. that are used in conjunction with an antiskid system.
15. A stripe or mark applied to a wheel rim and extending onto the sidewall of a tube type tire is a
  - a. wheel weight reference mark.
  - b. wheel-to-tire balance mark.
  - c. slippage mark.\*
16. When bleeding aircraft brakes, one of the indications that the air has been purged from the system is
  - a. full brake pedal travel.
  - b. partial brake pedal travel.
  - c. firm brake pedals.\*
17. Overinflated aircraft tires may cause damage to the
  - a. wheel flange.\*
  - b. brake linings.
  - c. wheel hub.
18. Deboost valves are used in brake systems primarily to
  - a. reduce the pressure and release the brakes rapidly.\*
  - b. reduce brake pressure and maintain static pressure.
  - c. ensure rapid application and release of the brakes.
19. The repair for an out of tolerance toe in condition of main landing gear wheels determined not to be the result of bent or twisted components consists of
  - a. shimming the axle in the oleo trunnion.
  - b. placing shims or spacers behind the bearing of the out of tolerance wheel or wheels.
  - c. inserting, removing, or changing the location of washers or spacers at the center pivotal point of the scissor torque links.\*
20. An embossed letter "H" on an air valve core stem
  - a. indicates high-pressure type.\*
  - b. indicates hydraulic type.
  - c. is the manufacturer's trademark.
21. The primary purpose for balancing aircraft wheel assemblies is to
  - a. prevent heavy spots and reduce vibration.\*
  - b. reduces excessive wear and turbulence.
  - c. distribute the aircraft weight properly.
22. Power boost brake systems are used on aircraft that have
  - a. high landing speeds.
  - b. low normal hydraulic system pressure.\*
  - c. more than one brake assembly per axle.
23. On all aircraft equipped with retractable landing gear, some means must be provided to
  - a. extend the landing gear if the normal operating mechanism fails.\*
  - b. retract and extend the landing gear if the normal operating mechanism fails.
  - c. prevent the throttle from being reduced below a safe power setting while the landing gear is retracted.
24. An automatic damping action occurs at the steer damper if for any reason the flow of high pressure fluid is removed from the
  - a. outlet of the steer damper.
  - b. replenishing check valve.
  - c. inlet of the steer damper.\*
25. What is the purpose of the torque links attached to the cylinder and piston of a landing gear oleo strut?
  - a. Limit compression stroke.
  - b. Maintain correct wheel alignment.\*
  - c. Hold the strut in place.
26. The removal, installation and repair of landing gear tires by the holder of a private pilot certificate on an aircraft owned or operated is considered to be
  - a. a violation of the Federal Aviation Regulations.
  - b. preventive maintenance.\*
  - c. a minor repair.
27. Aircraft brakes requiring a large volume of fluid to operate the brakes generally
  - a. use power brake control valves.\*
  - b. do not use brake system accumulators.
  - c. use independent master cylinder systems.

28. What is one effect a restricted compensator port of a master cylinder will have on a brake system?
- The reservoir will be filled by reverse flow.
  - The restriction will cause slow release of the brakes.\*
  - The brakes will operate normally.
29. When an air/oil type of landing gear shock strut is used, the initial shock of landing is cushioned by
- compression of the fluid.
  - the fluid being forced through a metered opening.\*
  - compression of the air charge.
30. A sleeve, spacer, or bumper ring is incorporated in a landing gear oleo shock strut to
- limit the extension stroke.\*
  - limit the extension of the torque arm.
  - reduce the rebound effect.
31. The purpose of a sequence valve in a hydraulic retractable landing gear system is to
- prevent heavy landing gear from falling too rapidly upon extension.
  - provide a means of disconnecting the normal source of hydraulic power and connecting the emergency source of power.
  - ensure operation of the landing gear and gear doors in the proper order.\*
32. The pressure source for power brakes is
- the main hydraulic system.\*
  - a master cylinder.
  - the power brake reservoir.
33. Which statement is true with respect to an aircraft equipped with hydraulically operated multiple disk type cylinder assemblies.
- There are no minimum or maximum disk clearance checks required due to the use of self compensating cylinder assemblies.
  - No parking brake provisions are possible for this type of brake assembly.
  - Do not set parking brake when brakes are hot.\*
34. What type of valve is used in the brake actuating line to isolate the emergency brake system from the normal power brake control valve system?
- A shuttle valve.\*
  - A bypass valve.
  - An orifice check valve.
35. When servicing an air/oil shock strut with MIL-5606 the strut should be
- collapsed and fluid added at the filler opening.\*
  - partially extended and fluid added at the filler opening.
  - fully extended and fluid added at the filler opening.
36. Instructions concerning the type of fluid and amount of air pressure to be put in a shock strut are found
- in the aircraft manufacturer's service manual.\*
  - in the aircraft operations limitations.
  - on the airplane data plate.
37. The purpose of a relief valve in a brake system is to
- prevent the tire from skidding.
  - reduce pressure for brake application.
  - compensate for thermal expansion.\*
38. Aircraft tire pressure should be checked
- using only a push on stick-type gauge having 1-pound increments.
  - at least once a week or more often.\*
  - as soon as possible after each flight.
39. If the extended longitudinal axis of the main landing gear wheel assemblies intersects aft of the aircraft, the wheels can be termed as having
- negative camber.
  - toe out.\*
  - toe in.
40. What is the purpose of a compensating port of valve in a brake master cylinder of an independent brake system?
- Permits the fluid to flow toward or away from the reservoir as temperature changes.\*
  - Prevents fluid from flowing back to the reservoir.
  - Assists in the master cylinder piston return.
41. If an aircraft shock strut (air/oil type) bottoms upon initial landing contact, but functions correctly during taxi, the most probable cause is
- a restricted metering pin orifice.
  - low air charge.
  - low fluid.\*
42. What is the function of a cam incorporated in a nose gear shock strut?
- Provides steering of aircraft during ground operation.
  - Straightens the nosewheel.\*
  - Provides in internal shimmy damper.
43. Extension of an oleo shock strut is measured to determine the
- physical condition of the strut itself.
  - amount of oil in the strut.
  - proper operating position of the strut.\*
44. Debooster cylinders are used in brake systems primarily to
- reduce the pressure to the brake and increase the volume of fluid flow.\*
  - relieve excessive fluid and ensure a positive release.
  - reduce brake pressure and maintain static pressure.
45. If a shock strut bottoms after it has been properly serviced, the
- air pressure should be increased.
  - strut should be disassembled and the metering pin orifice plate replaced.
  - strut should be removed, disassembled, and inspected.\*



46. A high speed aircraft tire with a sound cord body and bead may be recapped
- a maximum of three times.
  - only by the tire manufacturer.
  - an indefinite number of times.\*
47. If an airplane equipped with master cylinders and single disk brakes has excessive brake pedal travel, but the brakes are hard and effective, the probable cause is
- the master cylinder one way cup is leaking.
  - worn brake linings.\*
  - worn brake disk causing excessive clearance between the notches on the perimeter of the disk and the splines or keys on the wheel.
48. The correct inflation pressure for an aircraft tire can be obtained from
- the information stamped on the aircraft wheel.
  - the aircraft service manual.\*
  - tire manufacturer's specifications.
49. What should be checked when a shock strut bottoms during a landing?
- Fluid level.\*
  - Air pressure.
  - Packing seals for correct installation.
50. How can it be determined that all air has been purged from a master cylinder brake system?
- By noting whether the brake is firm or spongy.\*
  - By noting the amount of fluid return to the master cylinder upon brake release.
  - By operating a hydraulic unit and watching the system pressure gauge for smooth, full scale deflection.
51. The left brake is dragging excessively on an airplane on which no recent brake service work has been performed. The most probable cause is
- excessively worn brake linings.
  - low fluid supply in the brake system reservoir.
  - foreign particles stuck in the master cylinder compensating port.\*
52. If a brake booster is used in a hydraulic brake system, its position in the system will be
- in the brake pressure line between the brake pedal and the brake accumulator.
  - between the brake control valve and the brake actuating cylinder.\*
  - between the pressure manifold of the main hydraulic system and the power brake control valve.
53. The rubber seals used in a landing gear shock strut
- are generally designed to be compatible with more than one type of fluid.
  - may be used only with a specific type of fluid.\*
  - are kept from direct contact with fluid by teflon or nylon backup rings.
54. Lockout boosters generally
- cannot allow full booster piston travel without fluid from the high pressure side entering the low pressure chamber.
  - allow full booster piston travel without fluid from the high pressure side entering the low pressure chamber.\*
  - must be bled separately after brake bleeding has been completed.
55. When a properly operating fusible plug has allowed a tire to deflate, the tire should be
- externally inspected for damage.
  - removed from the wheel and inspected for carcass and tread damage.
  - replaced.\*
56. Chines are used on some aircraft nose wheel tires to
- help deflect water away from the fuselage.\*
  - help reduce the possibility of hydroplaning.
  - help nose gear extension at higher air speeds.
57. The best safeguards against heat buildup in aircraft tires are
- proper tire inflation, minimum braking, and ground rolls into the wind.
  - minimum braking, proper tire inflation, and long ground rolls.
  - short ground rolls, slow taxi speeds, minimum braking, and proper tire inflation.\*
58. The fusible plugs installed in some aircraft wheels will
- melt at a specified elevated temperature.\*
  - prevent overinflation.
  - indicate tire tread separation.
59. What action, if any, should be taken when there is a difference of more than 5 pounds of air pressure in tires mounted as duals?
- Replace the tire with the lowest pressure.
  - Replace both tires.
  - Correct the discrepancy and enter in logbook.\*
60. How long should you wait after a flight before checking tire pressure?
- At least 3 hours (4 hours in hot weather).
  - At least 2 hours (3 hours in hot weather).\*
  - At least 4 hours (5 hours in hot weather).
61. Excessive wear in the shoulder area of an aircraft tire is an indication of
- excessive toe in.
  - underinflation.\*
  - overinflation.
62. Excessive wear in the center of the tread of an aircraft tire is an indication of
- overinflation.\*
  - excessive toe out.
  - incorrect camber.

63. When an empty shock strut is filled with fluid, care should be taken to extend and compress the strut completely at least two times to
- ensure proper packing ring seating and removal of air bubbles.\*
  - force out any excess fluid.
  - thoroughly lubricate the piston rod.
64. In shock struts, chevron seals are used to
- serve as a bearing surface.
  - prevent oil from escaping.\*
  - absorb bottoming effect.
65. On most aircraft, the oil level of an air oil shock strut is checked by
- releasing the air and seeing that the oil is to the level of the filler plug.\*
  - measuring the length of the strut extension with the certain air pressure in the strut.
  - removing the oil filler plug and inserting a gauge.
66. A pilot reports that the brake pedals have excessive travel. A probably cause is
- brake lining has oil or some foreign matter on the disks and linings.
  - brake rotors have worn.\*
  - lack of fluid in the brake system.
67. A landing gear position and warning system will provide a warning in the cockpit when the throttle is
- advanced and gear is down and locked.
  - retarded and gear is down and locked.
  - retarded and gear is not down and locked.\*
68. An electric motor used to raise and lower a landing gear would most likely be a
- split field series wound motor.\*
  - shunt field series wound motor.
  - split field shunt wound motor.
69. When installing a chevron type seal in an aircraft hydraulic cylinder, the open side of the seal should face
- the direction of fluid pressure.\*
  - up or forward when the unit is installed in a horizontal position.
  - opposite the direction of fluid pressure.
70. Nose gear centering cams are used in many retractable landing gear systems. The primary purpose of the centering device is to
- engage the nosewheel steering.
  - center the nosewheel before it enters the wheel well.\*
  - align the nosewheel prior to touchdown.
71. (Refer to figure 9.33) The trunnion nut on an aircraft landing gear requires a torque of 320 inch-pounds. To reach the nut, a 2-inch straight adapter must be used on the torque wrench when the required torque of the nut is reached?
- 24.\*
  - 22.
  - 28.8.
72. A special bolt in a landing gear attachment requires a torque value of 440 inch-pounds. How many foot pounds are required?
- 36.6.\*
  - 38.
  - 36.8.

**QUESTIONS AND ANSWERS**

- What is the purpose of a torque link on an oleo strut?

Answer— To keep the wheel in alignment and prevent the piston from coming out of the cylinder.

- A landing gear shock strut should be inflated with what gas(es)?

Answer— Nitrogen or dry air.

- What conditions should a mechanic look for during a regular inspection of the exposed piston section of a landing gear?

Answer— Cleanliness, evidence of damage, and proper extension.

- What prevents air from leaking out between the two halves of a split wheel assembly?

Answer— An O-ring.

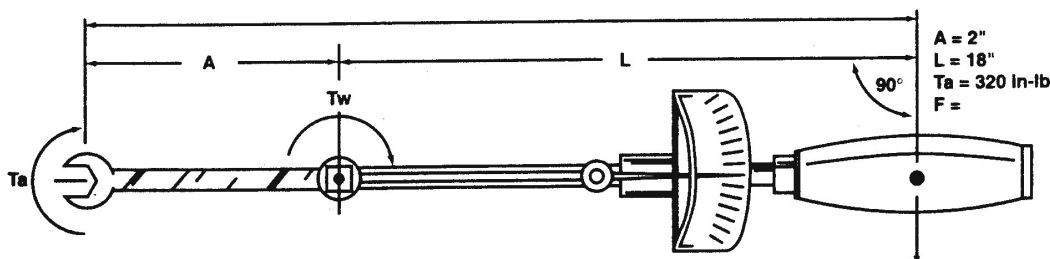


Figure 9.33.

5. What are fusible plugs installed on some aircraft wheels?

Answer– To release the pressure generated by heat build-up before a tire blows.

6. What safety precaution must be taken when removing a wheel from an axle or when disassembling a wheel?

Answer– Verify that the tire is completely deflated before removing a wheel from an axle or before wheel disassembly.

7. What are the visible signs of excessive heating on a wheel bearing?

Answer– The bearing surface show discoloration.

8. How are the pilot's nose wheel steering commands transmitted to the steering control unit of a large aircraft?

Answer– Steering signals may be transmitted mechanically, electrically, or hydraulically.

9. How is the nose wheel steering mechanism usually actuated on a small aircraft?

Answer– By means of a mechanical linkage connected to the rudder pedals.

10. What is the name of the unit that prevents a one wheel from vibrating or oscillating?

Answer– A shimmy damper.

11. What are the most common sources of power used to extend and retract landing gear?

Answer– Hydraulic pressure and electric motors.

12. At what times should a gear retraction check be performed?

Answer– During annual or other inspections and following a hard landing.

13. What mechanism (s) ensure that a nose wheel is not turned as it retracts into its wheel well?

Answer– Internal centering cams in the strut or an external track.

14. Name several types of brake actuating systems?

Answer– Independent master cylinders, boosted brakes, and power-controlled brakes.

15. What is the function of an anti-skid system?

Answer– Anti-skid systems allow large aircraft to achieve maximum braking effectiveness without allowing wheels to skid or lock.

16. What is the purpose of a deboosters?

Answer– To reduce hydraulic system high pressure to a lower value for more satisfactory brake action.

17. Describe two methods of bleeding brakes.

Answer– A pressure pot can be attached to the bleeder valve and fluid forced back towards the master cylinder and/ reservoir, or the master cylinder can be used for forcing fluid from the reservoir to the brakes.

18. Before a brake system can be inspected for leaks, what action must be accomplished?

Answer– Pressure must be applied to the system.

19. What maintenance function has the greatest impact on tire service life?

Answer– Ensuring that the tires are properly inflated.

20. What effect (s) under-inflation have on aircraft tires?

Answer– Internal heat damage possible leading to premature tire failure, and more tread wear on the shoulders than in the center.

## POSITION AND WARNING SYSTEMS

1. The purpose of antiskid generators is to
  - a. measure wheel rotational speed and any speed changes.\*
  - b. monitor hydraulic pressure applied to brakes.
  - c. indicate when a tire skid occurs.
2. In a brake antiskid system, when an approaching skid is sensed, an electrical signal is sent to the skid control valve which
  - a. relieves the hydraulic pressure on the brake.\*
  - b. acts as a bypass for the deboosters cylinders.
  - c. equalizes the hydraulic pressure in adjacent brakes.
3. An antiskid system is
  - a. a hydraulic system.
  - b. an electrical system.
  - c. an electrohydraulic system.\*
4. Antiskid braking systems are generally armed by
  - a. the rotation of the wheels above a certain speed.
  - b. a centrifugal switch.
  - c. a switch in the cockpit.\*
5. A typical takeoff warning indication system, in addition to throttle setting, monitors the position of which of the following?
  - a. Ailerons, elevators, speed brake, and steerable fuselage landing gear.
  - b. Elevators, speed brake, flaps, and stabilizer trim.\*
  - c. Aerodynamically actuated slats, elevators, flaps, and speed brake.

6. The primary purpose of a takeoff warning system is to alert the crew that a monitored flight control is not properly set prior to takeoff. The system is activated by
- a thrust lever.\*
  - an 80 knot airspeed sensor.
  - an ignition system switch not set for takeoff.
7. (1) An airspeed indicator measures the differential between pitot and static air pressures surrounding the aircraft at any moment of flight.  
(2) An airspeed indicator measures the differential between pitot and cabin air pressures at any moment of flight.  
Regarding the above statements,
- both No. 1 and No.2 are true.
  - only No. 2 is true.
  - only No. 1 is true.\*
8. The angle of attack detector operates from differential pressure when the airstream
- is parallel to the longitudinal axis of the aircraft.
  - is not parallel to the true angle of attack of the aircraft.\*
  - is parallel to the angle of attack of the aircraft.
9. (1) When an airplane is slowed below approximately 20 MPH, the antiskid system automatically deactivates to give the pilot full control of the brakes for maneuvering and parking.  
(2) An antiskid system consists basically of three components; wheel speed sensors, control box, and control valves.  
Regarding the above statements,
- only No. 1 is true.
  - both No. 1 and 2 are true.\*
  - only No. 2 is true.
10. In an antiskid system, wheel skid is detected by
- a sudden rise in brake pressure.
  - a discriminator.
  - an electrical sensor.\*
11. Which of the following functions does a skid control system perform?
- Normal skid control.
  - Normal braking.
  - Fail safe protection.
  - Locked wheel skid control.
  - Touchdown protection.
  - Takeoff protection.
- 1, 2, 5, 6.
  - 1, 3, 4, 5.\*
  - 1, 2, 3, 4.
12. In the air with the antiskid armed, current cannot flow to the antiskid control box because
- landing gear squat switch is open.\*
  - landing gear down and lock switch is open.
  - landing gear antiskid valves are open.
13. At what point in the landing operation does normal skid control perform its function?
- When wheel rotation deceleration indicates an impending skid.\*
  - Anytime the wheel is rotating.
  - When wheel rotation indicates hydroplaning condition.
14. (1) An antiskid system is designed to apply enough force to operate just below the skid point.  
(2) A warning lamp lights in the cockpit when the antiskid system is turned off or if there is a system failure.  
Regarding the above statements,
- only No. 1 is true.
  - both No. 1 and No. 2 are true.\*
  - only No. 2 is true.
15. When an airplane's primary flight control surfaces are set for a particular phase of flight, such as landing or takeoff, the corresponding control-surface indicating system will show
- speed break position.
  - flap/slat position.\*
  - trim position.
16. The pneumatic (reed) type stall warning system installed in some light aircraft is activated by
- positive air pressure.
  - static air pressure.
  - negative air pressure.\*
17. Stall warning systems are generally designed to begin warning the pilot when a stall
- is starting to occur.
  - first affects the outboard portions of the wings.
  - is imminent.\*
18. (Refer to figure 9.34) What is the indication of the red landing gear position light under the following conditions?  
Aircraft on jacks.  
Landing gear in transit.  
Warning horn sounding.
- flashing.
  - illuminated.
  - extinguished.\*
19. (Refer to figure 9.34). Which repair should be made if the gear switch was placed in UP position and the gear does not retract?
- Replace electrical wire No. 15.
  - Replace the down limit switch.
  - Replace electrical wire No. 12.\*
20. Which of the following conditions is most likely to cause the landing gear warning signal to sound?
- Landing gear locked down and throttle retarded.
  - Landing gear not locked down and throttle retarded.\*
  - Landing gear locked down and throttle advanced.

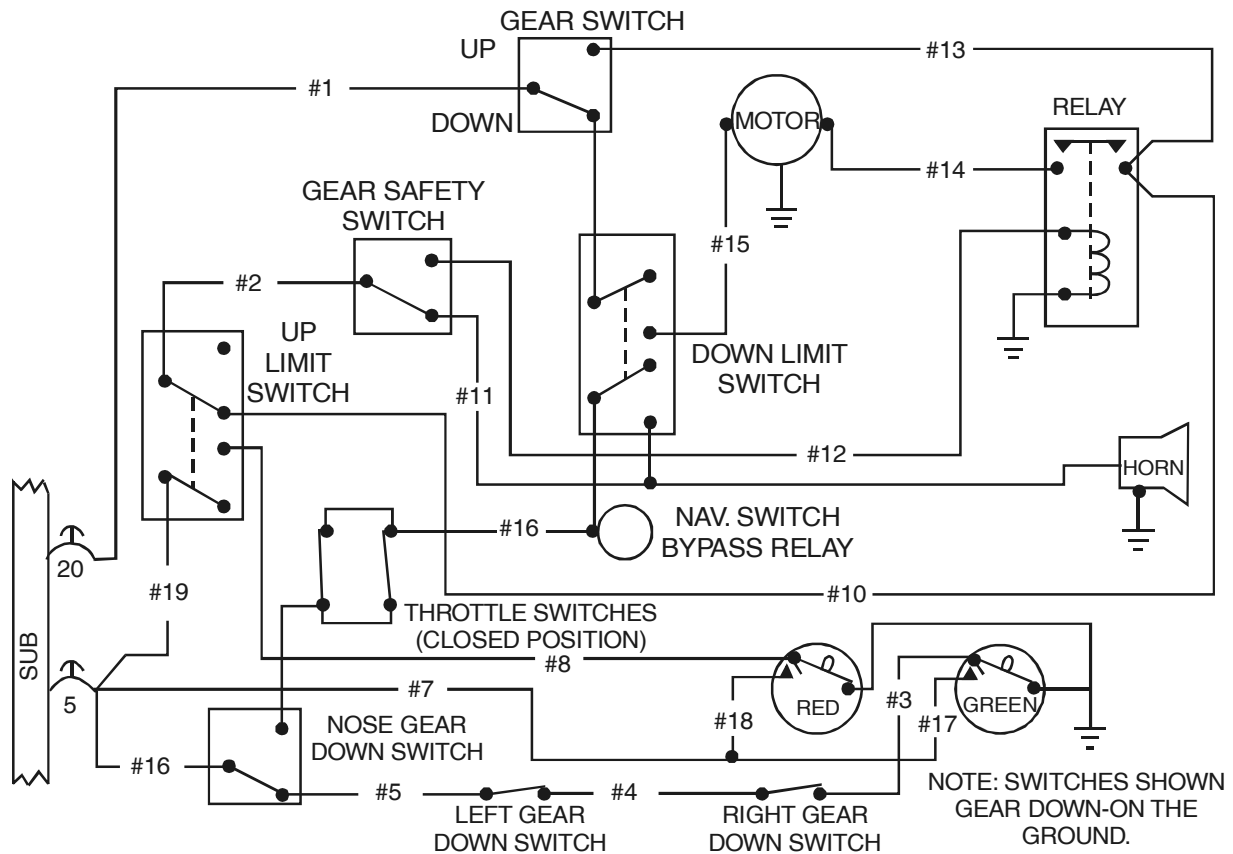


Figure 9.34

21. (Refer to figure 9.35) What will illuminate the amber indicator light?
  - a. Closing the nosewheel gear full retract switch.
  - b. Retarding one throttle and closing the left wheel gear locked down switch.
  - c. Closing the nose, left and right wheel gear full retract switches.\*
22. (Refer to figure 9.35) What is the minimum condition that will cause the landing gear warning horn to indicate an unsafe condition?
  - a. Any gear not down and locked, and one throttle\*
  - b. All gears up and one throttle retarded.
  - c. Any gear up and both throttles retarded.
23. Where is the landing gear safety switch usually located?
  - a. On the pilot's control pedestal.
  - b. On the main gear shock strut.\*
  - c. On the landing gear drag brace.
24. What safety device is actuated by the compression and extension of a landing gear strut?
  - a. Downlock switch.
  - b. Ground safety switch.\*
  - c. Unlock switch.
25. Which repair would require a landing gear retraction test?
  - a. Red warning light bulb.
  - b. Landing gear safe switch.
  - c. Gear downlock microswitch.\*
26. Landing gear warning systems usually provide which of the following indications?
  - a. Green light for gear up and down, red light for unsafe gear.
  - b. Red light for unsafe gear, green light for gear down, no light for gear up.\*
  - c. Red light for unsafe gear, no light for gear down, green light for gear up.
27. In most modern hydraulically actuated landing gear systems, the order of gear and fairing door operation is controlled by
  - a. sequence valves.\*
  - b. microswitches.
  - c. shuttle valves.
28. What landing gear warning device(s) are incorporated on retractable landing gear aircraft?
  - a. A light which comes on when the gear is fully down and locked.
  - b. A horn or other aural device and a red warning light.\*
  - c. A visual indicator showing gear position.

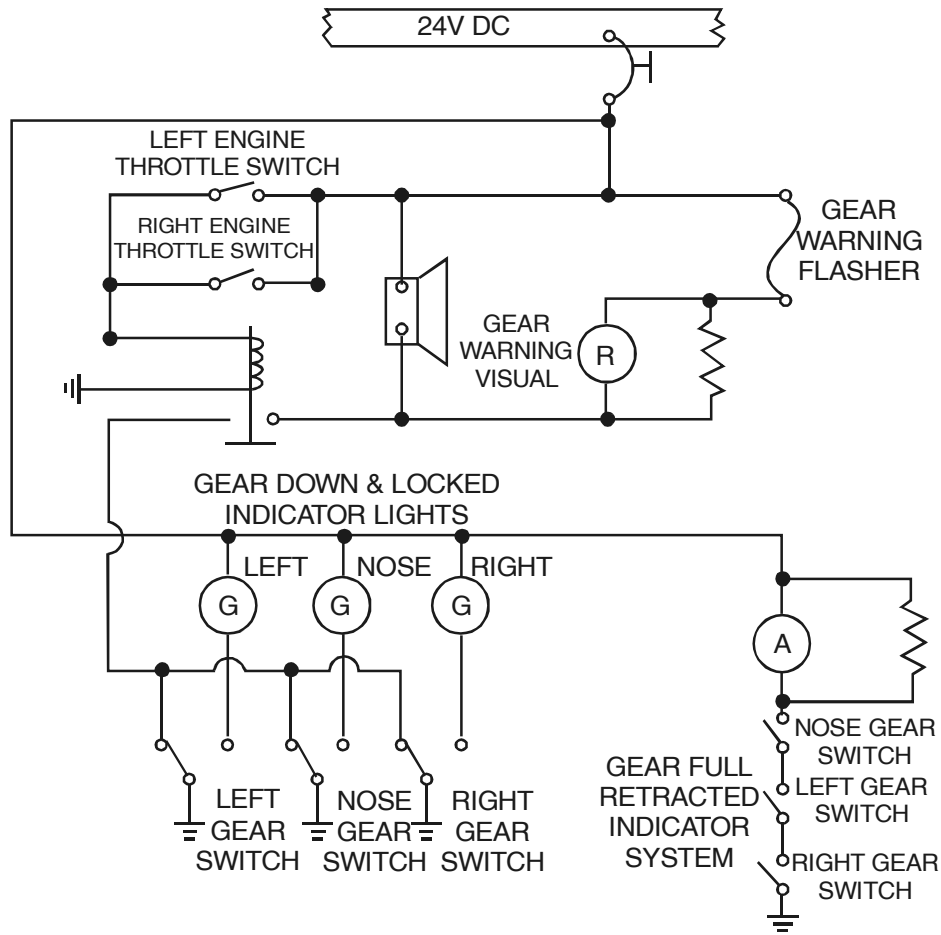


Figure 9.35.

29. When a landing gear safety switch on a main gear strut closes at lift-off, which system is deactivated?
- Antiskid system.\*
  - Aural warning system.
  - Landing gear position system.
30. The rotor in an autosyn remote indicating system uses
- neither an electromagnet nor a permanent magnet.
  - an electromagnet.\*
  - a permanent magnet.
31. The basic difference between an autosyn and a magnesyn indicating system is the
- rotor.\*
  - transmitter.
  - receiver.
32. The rotor in a magnesyn remote indicating system uses
- an electromagnet.
  - an electromagnet and a permanent magnet.
  - a permanent magnet.\*
33. Microswitches are used primarily as limit switches to
- prevent overcharging of a battery.
  - control electrical units automatically.\*
  - limit generator output.
34. Which of the following are some uses for a dc selsyn system?
- Indicates position of retractable landing gear.
  - Indicates the angle of incidence of an aircraft.
  - Indicates the altitude of an aircraft.
  - Indicates cowl flaps or oil cooler door position.
  - Indicates the rate of climb of an aircraft.
  - Indicates position of wing flaps.
- 2, 3, 5, 6.
  - 2, 3, 4, 5.
  - 1, 4, 5, 7.\*
35. (1) A dc selsyn system is a widely used electrical method of indicating a remote mechanical movement or position.  
 (2) A synchro type indicating system is an electrical system used for transmitting information from one point to another.  
 Regarding the above statements.
- both No. 1 and No.2 are true.\*
  - only No. 2 is true.
  - only No. 1 is true.

**QUESTIONS AND ANSWERS**

- What unit in an anti-skid system generates the anti-skid warning signal?  
 Answer– The control unit.

2. How is a pilot alerted that an anti skid system has automatically returned to a manual brake system?  
Answer– By a warning light.
3. What is the significance of an anti-skid warning?  
Answer– The system is off or has failed.
4. By what usual means does the stall warning system in a small aircraft alert the pilot of an impending stall?  
Answer– An audible alert and/or a warning light.
5. What devices are used to provide warnings for a retractable landing gear system?  
Answer– A horn or other aural device, and a red warning light or lights.
6. How can a pilot determine that the landing gear is down and locked?  
Answer– A green light or lights and/or another type of visual indicator.
7. Name at least two conditions that would activate a takeoff configuration warning system in a jet transport aircraft.  
Answer– Incorrect leading or trailing edge flap position, stabilizer position, or speed brake not stowed. The manufacturer may establish other conditions.
8. What landing gear positions must be indicated by regulations?  
Answer– Down and locked and up and locked.
9. Under what conditions will a landing gear aural warning sound?  
Answer– When the throttle is retarded and the landing gear is not down and locked.
10. How does a takeoff configuration warning differ from a landing gear warning?  
Answer–Takeoff warnings are usually an intermittent horns while landing gear warnings are steady.
11. What is the function of a Mach airspeed warning system?  
Answer– To alert the pilot that the never-exceed airspeed limit has been reached or exceeded.
12. What systems are commonly used to activate the landing gear warning systems?  
Answer– The throttles (thrust levers) and the wing flaps.
13. Why do airplanes with bleed air anti-icing of the wing leading edge has an anti-ice overheat light(s)?  
Answer– To indicate an over-temperature condition, usually as the result of a break in the bleed air ducts.
14. What warning system may be required when a nickel-cadmium battery is installed in an aircraft?  
Answer– A battery temperature monitoring system.
15. At what time would a check of a landing gear warning system normally be made?  
Answer– During a landing gear retraction test.
16. What is the purpose of an annunciator system?  
Answer– To show, by means of a warning light, that some system parameter requires attention by the flight crew.
17. If an aircraft with retractable landing gear has only one green light to indicate the gear is down and locked, how will the switches be connected, in series or in parallel?  
Answer– In series.
18. Where would you locate the procedures for checking and adjusting the landing gear switches?  
Answer– In the aircraft manufacturer's manual.
19. What is the usual means for alerting the crew of a jet transport that the cabin doors are not properly closed?  
Answer–A warning light.
20. Why are transport category aircraft equipped with a master caution and warning system?  
Answer– To alert the crew that a malfunction has occurred and corrective action may be required.

## AIRCRAFT INSTRUMENT SYSTEM

1. An aircraft magnetic compass is swung to up-date the compass correction card when
  - a. the compass is serviced.
  - b. equipment is added that could effect compass deviation.\*
  - c. an annual inspection is accomplished on the aircraft.
2. The operating mechanism of most hydraulic pressure gauges is
  - a. a Bourdon tube.\*
  - b. an evacuated bellows filled with an inert gas to which suitable arms, levers, and gears are attached.
  - c. an airtight diaphragm.

3. What is the fixed line mark attached to the compass bowl of a magnetic compass called?
  - a. Reference line.
  - b. Lubber line.\*
  - c. Reader line.
4. (1) Aircraft instruments are color-coded to direct attention to operational ranges and limitations.  
(2) Aircraft instruments range markings are not specified by Title 14 of the Code of Federal Regulations but are standardized by aircraft manufacturers.  
Regarding the above statements,
  - a. only No. 1 is true.\*
  - b. both No. 1 and No. 2 are true.
  - c. only No. 2 is true.
5. When swinging a magnetic compass, the compensators are adjusted to correct for
  - a. magnetic variations.
  - b. compass card oscillations.
  - c. magnetic influence deviation.\*
6. What will be the result if the instrument static pressure line becomes disconnected inside a pressurized cabin during cruising flight?
  - a. The altimeter will read low and the airspeed indicator will read high.
  - b. The altimeter and airspeed indicator will both read low.\*
  - c. The altimeter and airspeed indicator will both read high.
7. The maximum deviation (during level flight) permitted in a compensated magnetic direction indicator installed on an aircraft certificated under Federal Aviation Regulation Part 23 is
  - a. 10.\*
  - b. 6.
  - c. 8.
8. Magnetic compass bowls are filled with a liquid to
  - a. dampen the oscillation of the float.\*
  - b. reduce deviation errors.
  - c. retard precession of the float.
9. Instrument static system leakage can be detected by observing the rate of change in indication of the
  - a. airspeed indicator, after suction has been applied to the static system to cause a prescribed equivalent airspeed to the indicated.\*
  - b. altimeter, after suction has been applied to the static system to cause a prescribed equivalent altitude to be indicated.
  - c. altimeter, after pressure has been applied to the static system to cause a prescribed equivalent altitude to be indicated.
10. The maximum altitude loss permitted during a pressurized aircraft instrument static pressure system integrity check is
  - a. 200 feet in 1 minute.
  - b. 100 feet in 1 minute.\*
  - c. 50 feet in 1 minute.
11. Which statement regarding an aircraft instrument vacuum system is true?
  - a. If the air inlet to each vacuum instrument is connected to a common atmospheric pressure manifold, the system generally will be equipped with individual instrument filters only.
  - b. Vacuum systems are generally more effective at high altitudes than positive pressure systems.
  - c. Dry type vacuum pumps with carbon vanes are very susceptible to damage from solid airborne particles and must take in only filtered air.\*
12. When an aircraft altimeter is set at 29.9" Hg on the ground, the altimeter will read
  - a. field elevation.
  - b. density altitude.
  - c. pressure altitude.\*
13. Which of the following instrument discrepancies could be corrected by an aviation mechanic?
  1. Red line missing.
  2. Case leaking.
  3. Glass cracked.
  4. Mounting screws loose.
  5. Case paint chipped.
  6. Leaking at line B nut.
  7. Will not adjust.
  8. Fogged.
  - a. 1, 4, 6.
  - b. 1, 4, 5, 6.
  - c. 3, 4, 5, 6.\*
14. Which of the following instrument discrepancies would require replacement of the instrument?
  1. Red line missing.
  2. Case leaking.
  3. Glass cracked.
  4. Mounting screws loose.
  5. Case paint chipped.
  6. Leaking at line B nut.
  7. Will not zero out.
  8. Fogged.
  - a. 1, 3, 5, 8.
  - b. 1, 4, 6, 7.
  - c. 2, 3, 7, 8.\*
15. Which of the following instrument conditions is acceptable and would not require correction?
  1. Red line missing.
  2. Case leaking
  3. Glass cracked.
  4. Mounting screws loose.
  5. Case paint chipped.
  6. Leaking at line B nut.
  7. Will not zero out.
  8. Fogged.
  - a. None.
  - b. 1.
  - c. 5.\*



16. A barometric altimeter indicates pressure altitude when the barometric scale is set at
- field elevation.
  - 14.7" Hg.
  - 29.92" Hg.\*
17. A Bourdon tube instrument may be used to indicate
- pressure.
  - temperature.
  - position.
- 1.
  - 2 and 3.
  - 1 and 2.\*
18. A turn coordinator instrument indicates
- both roll and yaw.\*
  - the need for corrections in pitch and bank.
  - the longitudinal attitude of the aircraft during climb and descent.
19. Thermocouple leads
- are designed for a specific installation and may not be altered.\*
  - may be repaired using solderless connectors.
  - may be installed with either lead to either post of the indicator.
20. A synchro transmitter is connected to a synchro receiver
- electrically with wires.\*
  - mechanically through linkage.
  - electromagnetically without wires.
21. Operation of an angle of attack indicating system is based on detection of differential pressure at a point where the airstream flows in a direction
- parallel to the longitudinal axis of the aircraft.
  - parallel to the angle of attack of the aircraft.
  - not parallel to the true angle of attack of the aircraft.\*
22. Turbine engine exhaust gas temperatures are measured by using
- iron/constantan thermocouples.
  - chromel/alumel thermocouples.\*
  - ratiometer electrical resistance thermometers.
23. Fuel flow transmitters are designed to transmit data
- mechanically.
  - utilizing fluid power.
  - electrically.\*
24. Which of the following causes of aircraft magnetic compass inaccuracies may be compensated for by mechanics?
- Variation.
  - Magnetic compass current.
  - Deviation.\*
25. Who is authorized to repair an aircraft instrument?
- A certified mechanic with an airframe rating.
  - A certificated repairman with an airframe rating.
  - A certificated repair station approved for that class instrument.
  - A certificated airframe repair station.
- 3 and 4.
  - 3.\*
  - 1, 2, 3, and 4.
26. What does a reciprocating engine manifold pressure gauge indicate when the engine is not operating?
- Zero pressure.
  - The differential between the manifold pressure and the atmospheric pressure.
  - The existing atmospheric pressure.\*
27. The requirements for testing and inspection of instrument static systems required by Section 91.411 are contained in
- AC 43.13-1A.
  - Type Certificate Data Sheets.
  - Part 43, appendix E.\*
28. Which condition would be most likely to cause excessive vacuum in a vacuum system?
- Vacuum relief valve improperly adjusted.\*
  - Vacuum pump over speed.
  - Vacuum relief valve spring weak.
29. Data transmitted between components in an EFIS are converted into
- digital signals.\*
  - analog signals.
  - carrier wave signals.
30. The function of a CRT in an EFIS is to
- allow the pilot to select the appropriate system configuration for the current flight situation.
  - display alphanumeric data and representations of aircraft instruments.\*
  - receive and process input signals from aircraft and engine sensors and send the data to the appropriate display.
31. The function of a symbol generator (SG) in an EFIS is to
- receive and process input signals from aircraft and engine sensors and send the data to the appropriate display.\*
  - allow the pilot to select the appropriate system configuration for the current flight situation.
  - display alphanumeric data and representations of aircraft instruments.
32. The function of a display controller in an EFIS is to
- display alphanumeric data and representation of aircraft instruments.
  - receive and process input signals from aircraft and engine sensors and send the data to the appropriate display.
  - allow the pilot the select the appropriate system configuration for the current flight situation.\*

33. A radar altimeter determines altitude by
- means of transponder interrogation.
  - receiving signals transmitted from ground radar stations.
  - transmitting a signal and receiving back a reflected signal.\*
34. A radar altimeter indicates
- altitude above ground level.\*
  - altitude above sea level.
  - flight level (pressure) altitude.
35. Resistance-type temperature indicators using Wheatstone bridge or ratiometer circuits may be used to indicate the temperatures of which of the following?
- Free air.
  - Exhaust gas temperature.
  - Carburettor air.
  - Coolant (engine).
  - Oil temperature.
  - Cylinder head temperature.
- 1, 2, 3, 4, 5, and 6.
  - 1, 2, 3, and 6.
  - 1, 3, 4, and 5.\*
36. When flags such as NAV, HDG, or GS are displayed on an HSI, the indication is
- that function is operating.
  - that function is inoperative.\*
  - to call attention to deviation from the desired setting, or flight path, or heading, etc.
37. Instrument panel shock mounts absorb
- low frequency, high-amplitude shocks.\*
  - high G shock loads imposed by turbulent air.
  - high energy impact shocks caused by hard landings.
38. Which procedure should you use if you find a vacuum operated instrument glass loose?
- Mark the case and glass with a slippage mark.
  - Replace the glass.
  - Install another instrument.\*
39. Which instruments are connected to an aircraft's pitot static system?
- Vertical speed indicator.
  - Cabin altimeter.
  - Altimeter.
  - Cabin rate-of-change indicator.
  - Airspeed indicator.
- 1, 2, 3, 4, and 5.
  - 1, 2, and 4.
  - 1, 3, and 5.\*
40. How many of the following instruments will normally have range markings?
- Airspeed indicator.\*
  - Altimeter.
  - Cylinder head temperature gauge.
- Two.
  - One.
  - Three.
41. How would an airspeed indicator be marked to show the best rate of climb speed (one engine inoperative)
- A green arc.
  - A blue radial line.\*
  - A red radial line.
42. The green arc on an aircraft temperature gauge indicates
- the instrument is not calibrated.
  - a low, unsafe temperature range.
  - the desirable temperature range.\*
43. What must be done to an instrument panel that is supported by shock mounts?
- Bonding straps must be installed across the instrument mounts as a current path.\*
  - The instrument mounts must be grounded to the aircraft structure as a current path.
  - The instrument mounts must be tightened to the specified torque required by the maintenance manual.
44. What marking color is used to indicate if a cover glass has slipped?
- Yellow.
  - White.\*
  - Red.
45. Aircraft instruments should be marked and graduated in accordance with
- both the aircraft and engine manufacturers' specifications.
  - the instrument manufacturer's specifications.
  - the specific aircraft maintenance or flight manual.\*
46. Aircraft instrument panels are generally shock mounted to absorb
- low frequency, high amplitude shocks.\*
  - high frequency, high amplitude shocks.
  - all vibration.
47. The method of mounting aircraft instruments in their respective panels depends on the
- instrument manufacturer.\*
  - design of the instrument panel.
  - design of the instrument case.
48. How is a flangless instrument case mounted in an instrument panel?
- By four machine screws which extend through the instrument panel.
  - By an expanding type clamp secured to the back of the panel and tightened by a screw from the front of the instrument panel.\*
49. Cases of electrically operated instruments are made of
- Iron or steel cases.\*
  - Plastic or composite cases.
  - Aluminum or bakelite cases.

50. When installing an instrument in an aircraft, who is responsible for making sure it is properly marked?
- The instrument manufacturer.
  - The aircraft owner.
  - The instrument installer.\*
51. Where may a person look for the information necessary to determine the required markings on an engine instrument?
- Engine manufacturer's specifications.
  - Aircraft flight manual.
  - Instrument manufacturer's specifications.
  - Aircraft maintenance manual.
- 2 or 4.\*
  - 2 or 3.
  - 1 or 4.
52. A certificated mechanic with airframe and powerplant ratings may
- perform minor repairs to aircraft instruments.
  - not perform repairs to aircraft instruments.\*
  - perform minor repairs and minor alterations to aircraft instruments.
53. The red radial lines on the face of an engine oil pressure gauge indicates
- minimum engine safe RPM operating range.
  - minimum precautionary safe operating range.
  - minimum and/or maximum safe operating limits.\*
54. A certificated mechanic may perform
- minor repairs to instruments.
  - instrument overhaul.
  - 100-hour inspections of instruments.\*
55. An aircraft instrument panel is electrically bonded to the aircraft structure to
- act as a restraint strap.
  - provide current return paths.\*
  - aid in the panel installation.
56. How many of the following are controlled by gyroscopes?
- Attitude indicator.
  - Heading indicator.
  - Turn needle of the turn and slip indicator.
- Three.\*
  - One.
  - Two.
57. The lubber line on a directional gyro is used to
- represent the wings of the aircraft.
  - represent the nose of the aircraft.\*
  - align the instrument glass in the case.
58. Which instruments are connected to an aircraft's static pressure system only?
- Vertical speed indicator.
  - Cabin altimeter.
  - Altimeter.
  - Cabin rate-of-change indicator.
  - Airspeed indicator.
- 2 and 4.
  - 1 or 5.\*
  - 3.
59. If a static pressure system check reveals excessive leakage, the leak(s) may be located by
- pressurizing the system and adding leak detection dye.
  - isolating portions of the line and testing each portion systematically, starting at the instrument connections.\*
  - removing and visually inspecting the line segments.
60. When performing the static system leakage check required by Section 91.411 the technician utilizes
- static pressure.
  - negative pressure.\*
  - positive pressure.

### QUESTIONS AND ANSWERS

1. A static check may be performed on a manifold pressure gauge by using what piece of information?

Answer— Current atmospheric pressure.

2. What aircraft instrument can be used to check a manifold pressure gauge for proper indication?

Answer— The sensitive altimeter.

3. Name several of the indication errors that may be found in altimeters.

Answer— Scale errors, hysteresis, friction, installation.

4. What is the signal source in an electrical resistance-type temperature indicating system?

Answer— A temperature bulb or sensing element.

5. What type of temperature sensing system is normally used to measure a turbine engine exhaust gas temperature?

Answer — A thermocouple-type system.

6. What operating parameter is indicated by a tachnometer?

Answer— Engine RPM (i.e., crankshaft or turbine rotor speed).

7. What is the name of the effect that causes a gyro to respond to an applied force at a point 90 degrees further in the direction of rotation?

Answer— Gyroscopic precession

8. What are the three sources of power used to drive a gyroscopic turn indicator?

Answer— Air from a vacuum or pressure source, or an electric motor.

9. What are two items that should be consider during inspection of a magnetic compass?

Answer–

1. The fluid must be clear.
2. The housing must be full with no bubbles.
3. The card must be legible and the lubber line intact.
4. The compass should be properly calibrated.

10. In what way do magnetic fields generated by electrical equipment and steel parts in the airplane affect a magnetic compass?

Answer– Stray magnetic fields deflect the compass from correct alignment with the earth's magnetic field.

11. Describe the basic operating concept of a synchro-type remote indicating system.

Answer– A remote transmitter electrically signals a receiver inside the instrument.

12. What aircraft instruments are connected to the pitot-static system?

Answer– The altimeter, vertical speed indicator, airspeed and mach meter in high performance jets.

13. Why should you avoid cleaning obstructions from the sensing holes in a pitot-static system with a tool?

Answer– The holes are aerodynamically critical.

14. After components in a pitot- static system have been replaced, what tests or inspections are required?

Answer– The static system leak test specified by FAR 91.411.

15. What quantity is accurately measured by a capacitance-type fuel quantity indicating system?

Answer– The mass of the fuel.

16. Who is authorized to apply the range markings to an instrument dial face?

Answer– The manufacturer or a certificated instrument repair station.

17. What is the purpose of a slippage mark on an instrument glass?

Answer To indicate if the glass has moved, which could cause incorrect range markings on an instrument that has the range markings painted on the glass.

18. What references should be consulted to determine the proper range markings for aircraft instruments?

Answer– The aircraft maintenance manual, aircraft flight manual, Type Certificate Data Sheets or Aircraft Specifications.

19. What is the meaning of a yellow arc on an aircraft instrument?

Answer– A caution or limited flight operations range.

20. What is the reason for “swinging” a compass and how is it accomplished?

Answer– To compensate for deviations, caused by magnetic fields in the aircraft, by adjusting the compensating magnets.

## AIRCRAFT AVIONICS SYSTEM

1. What is the primary purpose of an autopilot?
  - a. To fly a more precise course for the pilot.
  - b. To obtain the navigational aid necessary for extended overwater flights.
  - c. To relieve the pilot of control of the aircraft during long periods of flight.\*
2. Which of the following provides manual maneuverability of the aircraft while the autopilot is engaged?
  - a. Directional gyro indicator.
  - b. Servo amplifier.
  - c. Flight controller.\*
3. In an autopilot, which signal nullifies the input signal to the ailerons?
  - a. Course signal.
  - b. Follow-up signal.\*
  - c. Displacement signal.
4. In which control element of an autopilot system is attitude indicator?
  - a. Sensing.\*
  - b. Command.
  - c. Input.
5. What is the operating principle of the sensing device used in an autopilot system?
  - a. The rate of change of motion between the gyro gimbal rings and the aircraft.
  - b. The reaction of the force 90° away from the applied force in the direction of gyro rotation.
  - c. The relative motion between a gyro and its supporting system.\*
6. What will occur if an aircraft attitude is charnged by its autopilot system in order to correct for an error and the involved control surfaces are returned to streamline by the time the aircraft has reached its correct position?
  - a. Normal operation.\*
  - b. Overshoot and oscillation.
  - c. Undershoot and oscillation.

7. What component of an autopilot system applies torque to the control surfaces of an aircraft?  
 a. Controller.  
 b. Gyro.  
 c. Servo.\*
8. What is the main purpose of a servo in an autopilot system?  
 a. Correct for displacement of the aircraft about its axis.  
 b. Move the control surface as commanded.\*  
 c. Change mechanical energy to electrical energy.
9. Which channel of an autopilot detects changes in pitch attitude of an aircraft?  
 a. Aileron.  
 b. Elevator.\*  
 c. Rudder.
10. The elevator channel of an autopilot controls the aircraft about which axis of rotation?  
 a. Lateral.\*  
 b. Roll.  
 c. Longitudinal.
11. What component is the sensing device in an electro mechanical autopilot system?  
 a. Gyro.\*  
 b. Servo.  
 c. Controller.
12. A fully integrated autopilot controls the aircraft around how many axes?  
 a. Four.  
 b. Two.  
 c. Three.\*
13. Dutch roll, a combination yawing and rolling oscillation that affects many swept wing aircraft, is counteracted with  
 a. a yaw damper system.\*  
 b. an aileron damper system.  
 c. a flight director system.
14. When operationally checking an autopilot system on the ground, after the aircraft's main power has been switched on, the autopilot should be engaged.  
 a. only after the gyros come up to speed and the amplifier warms up.\*  
 b. for only a few minutes at a time.  
 c. whenever the operator desires.
15. Installed radio equipment is protected from damage due to jolts and vibration by  
 a. shock mounts.\*  
 b. spring and/or viscous damper mounted racks.  
 c. rubber or foam cushioning material between circuit chassis and case.
16. (1) Use solder to attach bonding jumpers on radio equipment.  
 (2) Radio equipment is bonded to the aircraft in order to provide a low impedance ground and to minimize radio interference from static electrical changes.  
 Regarding the above statements,  
 a. only No. 2 is true.\*  
 b. only No. 1 is true.  
 c. both No. 1 and 2 are true.
17. When must the radio station license be displayed in an aircraft equipped with a two-way radio?  
 a. When the aircraft is certified for IFR flight.  
 b. When the aircraft is operated outside the U.S.\*  
 c. When the aircraft is returned to service.
18. When would a U.S. resident NOT be required to hold a Federal Communications Commission (FCC) Restricted Radio Telephone Operator Permit to operate two-way aircraft VHF radio equipment?  
 a. When flying or communicating within the United States.\*  
 b. When flying to or communicating with destinations outside the United States.  
 c. When the radio equipment is operated in aircraft certified for VFR flight only.
19. Part of the ADF system used on aircraft includes  
 a. sense and loop antennas.\*  
 b. RMI indicator antenna.  
 c. marker beacon antenna.
20. When installing coaxial cable, it should be secured firmly along its entire length  
 a. wherever the cable sags.  
 b. at 1-foot intervals.  
 c. at 2-foot intervals.\*
21. When must the emergency locator transmitter (ELT) battery be replaced (other than reading the replacement date)?  
 a. When the transmitter has been tested more than ten times.  
 b. When the transmitter has been in use for more than one cumulative hour.\*  
 c. Must be replaced annually or if the five G switch has been activated.
22. An emergency locator transmitter (ELT) battery must be capable of furnishing power for signal transmission for at least  
 a. 48 hours.\*      b. 36 hours.  
 c. 72 hours.
23. The preferred location of an ELT is  
 a. where it is readily accessible to the pilot or a member of the flightcrew while the aircraft is in flight.  
 b. as far aft as possible, but forward of the vertical fin.\*  
 c. as far aft as possible.

24. An emergency locator transmitter (ELT) is normally activated by an inertial switch or equivalent mechanism if subjected to a force of a prescribed intensity and duration. It must activate when the force is applied
  - a. parallel to the longitudinal axis of the aircraft.\*
  - b. in any direction relative to the aircraft axes.
  - c. parallel to the vertical axis of the aircraft.
25. How may the battery replacement date be verified for an emergency locator transmitter (ELT)?
  - a. By activating the transmitter and measuring the signal strength.
  - b. By removing the batteries and testing them under a measured load to determine if 50 percent of the useful life remains.
  - c. By observing the battery replacement date marked on the outside of the transmitter.\*
26. How may the operation of an installed emergency locator transmitter (ELT) be verified during aircraft inspection?
  - a. By moving the deactivating switch from the DISARM position to the ARM position, while monitoring the civil emergency frequency with a communications receiver at five minutes after the hour.
  - b. By tuning a communications receiver to the civil emergency frequency, and activating the ELT momentarily within five minutes after the hour.\*
  - c. By activating the 5 g switch and turning the unit on at five minutes after the hour.
27. Static discharges help eliminate radio interference by dissipating static electricity into the atmosphere at
  - a. low current levels.\*
  - b. high voltage level.
  - c. high current levels.
28. Long Range Navigation (LORAN) systems determine aircraft location by
  - a. measuring the inertial forces acting on the aircraft.
  - b. means of pulsed signals transmitted from ground stations.\*
  - c. means of signals transmitted to and from navigation satellites.
29. An aircraft antenna installation must be grounded
  - a. to the airframe.\*
  - b. to the radio rack.
  - c. to the engine.
30. VHF radio signals are commonly used in
  - a. both VOR navigation and ATC communications.\*
  - b. ATC communications.
  - c. VOR navigation.
31. On modern large aircraft, what electronic device typically monitors flight parameters and performs autopilot functions?
  - a. Control/display unit.
  - b. Transponder.
  - c. Flight management computer.\*
32. In the landing configuration GPWS typically monitors the radio (radar) altimeter, air data computer; instrument landing system, and
  - a. aileron, rudder, and elevator positions.
  - b. landing gear and flap positions.\*
  - c. spoiler, slat, and stabilizer positions.
33. In general, the purpose of an aircraft transponder is to
  - a. continually transmit heading, speed, and rate of climb/decent etc. information to ATC.
  - b. monitor aircraft speed, heading attitude, and attitude whenever the autopilot system is engaged.
  - c. receive an interrogation signal from a ground station and automatically send a replay back.\*
34. When an antenna is installed, it should be fastened
  - a. to the primary structure at the approximate intersection for the three aircraft axes.
  - b. with a reinforcing doubler on each side of the aircraft skin.
  - c. so that loads imposed are transmitted to the aircraft structure.\*
35. After an automatic direction finding antenna has been installed, the
  - a. loop must be calibrated.\*
  - b. antenna must be grounded.
  - c. transceiver must be compensated.
36. Doubler are used when antennas are installed to
  - a. prevent oil canning of the skin.
  - b. eliminate antenna vibration.
  - c. reinstate the structural strength of the aircraft skin.\*
37. One antenna can be used for the radio range and standard broadcast bands in light aircraft because the
  - a. antenna is omnidirectional.
  - b. antenna length may be electronically adjusted.
  - c. two ranges are close together.\*
38. What characteristics of the installation of a rigid antenna on a vertical stabilizer should be evaluated?
  - a. Polarization and impedance.
  - b. Flutter and vibration.\*
  - c. Impedance and interference.
39. A gasket or sealant is used between the antenna mast and fuselage skin
  - a. for aircraft pressurization only.
  - b. to prevent the entry of moisture.\*
  - c. to prevent abrasion between the antenna mast and fuselage skin.
40. The preferred location of a VOR antenna on light aircraft is on
  - a. top of the cabin with the apex of the V pointing forward.\*
  - b. top of the vertical stabilizer.
  - c. the bottom of the fuselage and as far forward as possible.

41. The purpose of a localizer is to
- set the airplane on the proper approach angle to the runway.
  - indicate the distance the airplane is from the end of the runway.
  - align the airplane with the center of the runway.\*
42. (Refer to figure 9.36) What is the approximate drag load on an antenna with a frontal area of .125 square feet installed on an aircraft with a speed of 225 MPH?
- 2.080 pounds.
  - 2.069 pounds.\*
  - 2.073 pounds.
43. (Refer to figure 9.36) What is the approximate drag load on an antenna with frontal area of .137 square feet installed on an aircraft with a speed of 275 MPH?
- 3.592 pounds.
  - 3.387 pounds.\*
  - 3.741 pounds.
44. A DME antenna should be located in a position on the aircraft that will
- permit interruptions in DM operation.
  - not be blanked by the wing when the aircraft is banked.\*
  - eliminate the possibility of the DME locking on a station.
45. When bending coaxial cable, the bend radius should be at least
- 10 times the diameter of the cable.\*
  - 15 times the diameter of the cable.
  - 20 times the diameter of the cable.
46. When installing a DME antenna, it should be aligned with the
- centerline on the airplane.\*
  - angle of incidence.
  - null position.
47. (Refer to figure 9.37) Which of the antennas shown is a typical DME antenna?
- 1.\*
  - 2.
  - 4.
48. (Refer to figure 9.37) Which of the antennas shown is a typical glideslope antenna?
- 2.\*
  - 3.
  - 4.

$$D = 0.000327 AV^2$$

Figure 9.36.

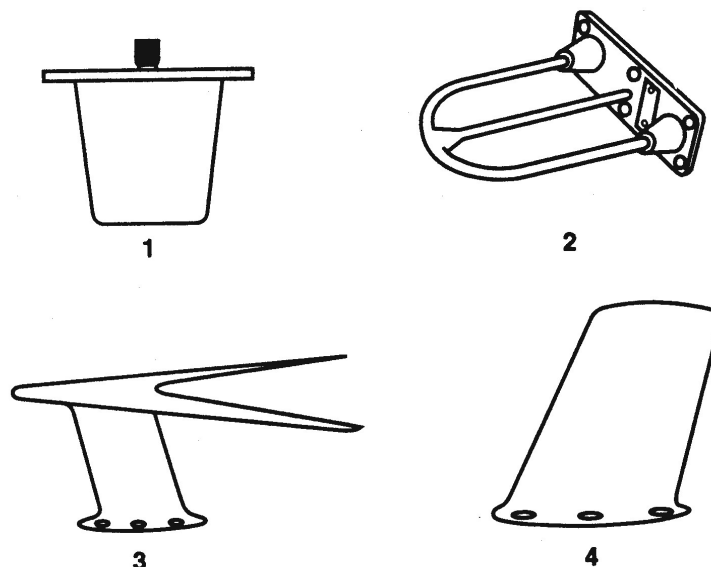


Figure 9.37.

49. The addition of avionics and associated antenna systems forward of the CG limit will affect
- CG limits and useful load.
  - useful load and maximum gross weight.
  - empty weight and useful load.\*
50. How much clearance from the seat bottom is required when installing radio equipment under a seat?
- No set minimum as long as the equipment receives adequate cooling and damage protection.
  - 3 inches with the seat unoccupied.
  - 1 inches with the seat occupied and subjected to maximum downward seat spring deflection.\*
51. The purpose of a glideslope system is to
- indicate the distance the airplane is from the end of the runway.
  - assist the pilot in making a correct angle of descent to the runway.\*
  - provide for automatic altitude reporting to air traffic control.
8. Why are two antennas usually required for an ILS system?
- Answer– The localizer and glideslope signals are transmitted on different frequencies.
9. What information does the glideslope beam provide?
- Answer– Vertical guidance to enable the aircraft to maintain the correct descent angle.
10. What is the power source for an ELT (Emergency Locator Transmitter)?
- Answer– An internal battery.
11. Describe one method of monitoring the signal output during an ELT test?
- Answer– Tune a communications receiver to 121.5 MHz.

### QUESTIONS AND ANSWERS

1. What are the basic components of a radio communication system?
- Answer– A microphone, transmitter, transmitting and receiving antennas, receiver, and speaker or headphones.
2. What frequency range is used by most modern voice communications systems?
- Answer– The VHF (Very High Frequency) band (118.0 to 136.975 MHz).
3. What does the term “ADF” stand for?
- Answer– Airborne Direction Finding (Finder)
4. What is the function of VOR equipment?
- Answer– Navigation
5. Name the components of a typical airborne VOR navigation system.
- Answer– A receiver, antennas, frequency selector and a visual display indicator.
6. What does DME stand for?
- Answer– Distance Measuring Equipment
7. At what interval must an ATC transponder system be certified?
- Answer– Every 24 calendar months.
12. How could you determine if the batteries in an ELT are due for recharge or replacement?
- Answer– By looking for an expiry date for recharge or replacement on the battery and/or in the aircraft maintenance records.
13. At what time (s) is a test of an installed ELT permitted?
- Answer– During the first 5 minutes and for no more than 2 sweeps.
14. Where on the aircraft would you expect to find a DME antenna?
- Answer– Generally on the bottom of the fuselage in a location that isn’t blocked by the wing during turns.
15. Describe the shape and location of a transponder antenna.
- Answer– Either a short blade or a short wire with a ball end located on the bottom of the fuselage.
16. Name the basic components of an autopilot system.
- Answer– Gyros, servos, a controller, and an amplifier or computer.
17. What are the sensing elements of an autopilot system?
- Answer– Attitude, directional and turning gyros and an altitude sensor.
18. What is the function of the servos in an autopilot system?
- Answer– The servos actuate the flight controls.



19. What is the purpose of a bonding jumper from a radio shock mount to the airframe?

Answer– To provide a low-impedance ground return.

20. Describe the procedure used to route coaxial cable from an antenna to a receiver.

Answer– The cable should be supported every 2 feet, bends should be 10 times the cable diameter, and it should be routed separately from other wires.

## AIRFRAME ICE AND RAIN CONTROL

1. When installing pneumatic surface-bonded type deicer boots,
  - a. apply a solution of glycerine and water between the rubber and the wing skin.
  - b. apply a silastic compound between the boot and the wing skin.
  - c. remove all paint from the area to be covered by the deicer boot.\*
2. Which of the following are found in a laminated integral electrically heated windshield system?
  1. Autotransformer.
  2. Heat control relay.
  3. Heat control toggle switch.
  4. 24V dc power supply.
  5. Indicating light.

a. 2, 3, 4, 5.                      b. 1, 2, 3, 5.\*  
c. 1, 2, 4, 5.
3. What is one check for proper operation of a pitot/static tube heater after replacement?
  - a. Ammeter reading.\*
  - b. Continuity check of system.
  - c. Voltmeter reading.
4. What controls the inflation sequence in a pneumatic deicer boot system?
  - a. Vacuum pump.
  - b. Shuttle valve.
  - c. Distributor valve.\*
5. What is the source of pressure for inflating deicer boots on reciprocating engine aircraft?
  - a. Vane type pump.\*
  - b. Piston type pump.
  - c. Gear type pump.
6. Which of the following regulates the vacuum of the air pump to hold the deicing boots deflated when the pneumatic deicing system is off?
  - a. Distributor valve.
  - b. Pressure regulator.
  - c. Suction relief valve.\*
7. What may be used to clean deicer boots?
  - a. Unleaded gasoline or Jet A fuel.
  - b. Naphtha.
  - c. Soap and water.\*
8. Some aircraft are protected against airframe icing by heating the leading edges of the airfoils and intake ducts. When is the type of anti ice system usually operated during flight?
  - a. Whenever icing conditions are first encountered or expected to occur.\*
  - b. In symmetric cycles during icing conditions to remove ice as it accumulates.
  - c. Continuously while the aircraft is in flight.
9. Which of the following indications occur during a normal operational check of a pneumatic deicer system?
  - a. Pressure and vacuum gauges will fluctuate as the deicer boots inflate and deflate.
  - b. Relatively steady readings on the pressure gauge and fluctuating readings on the vacuum gauge.
  - c. Fluctuating readings on the pressure gauge and relatively steady readings on the vacuum gauge.\*
10. What method is usually employed to control the temperature of an anti icing system using surface combustion heaters?
  - a. Thermostats in the cockpit.
  - b. Heater fuel shutoff valves.
  - c. Thermo cycling switches.\*
11. What is the purpose of the distributor valve in a deicing system utilizing deicer boots?
  - a. To sequence the deicer boots inflations symmetrically.\*
  - b. To distribute anti-icing fluid to the deicer boots.
  - c. To equalize the air pressure to the left and right wings.
12. What is the purpose of the oil separator in the pneumatic deicing system?
  - a. To prevent an accumulation of oil in the vacuum system.
  - b. To remove oil from air exhausted from the deicer boots.
  - c. To protect the deicer boots from oil deterioration.\*
13. Where are the heat sensors located on most aircraft with electrically heated windshields?
  - a. Imbedded in the glass.\*
  - b. Around the glass.
  - c. Attached to the glass.
14. Two possible sources of heat for the operation of a wing thermal anti-icing system are
  - a. compressor bleed air, aircraft electrical system.
  - b. first stage of the aircycle turbine, turbo compressor.
  - c. combustion heater, exhaust gases.\*

15. What maintains normal windshield temperature control in an electrically heated windshield system?
  - a. Thermistors.\*
  - b. Electronic amplifiers.
  - c. Thermal overheat switches.
16. Arcing in an electrically heated windshield panel usually indicates a breakdown in the
  - a. temperature sensing elements.
  - b. conductive coating.\*
  - c. autotransformers.
17. Which of the following connects vacuum to the deicer boots when the systems is not in operation, to hold the boots tightly against the leading edges in flight?
  - a. Distributor valve.\*
  - b. Ejector.
  - c. Vacuum relief valve.
18. How do deicer boots help remove ice accumulations?
  - a. By allowing only a thin layer of ice to build up.
  - b. By preventing the formation of ice.
  - c. By breaking up ice formations.\*
19. Why are the tubes in deicer boots alternately inflated?
  - a. Alternate inflation of deicer boot tubes do not disturb airflow.
  - b. Alternate inflation of deicer boot tubes keeps disturbance of the airflow to a minimum.\*
  - c. Alternate inflation of deicer boot tubes relieves the load on the air pump.
20. Carburetor icing may be eliminated by which of the following methods?
  - a. Ethylene glycol spray and heated induction air.
  - b. Electrically heating air intake, ethylene glycol spray, or alcohol spray.
  - c. Alcohol spray and heated induction air.\*
21. Why should a chemical rain repellent not be used on a dry windshield?
  - a. It will cause glass crazing.
  - b. It will etch the glass.
  - c. It will restrict visibility.\*
22. What is the principle of a windshield pneumatic rain removal system?
  - a. An air blast spreads a liquid rain repellent evenly over the windshield that prevents raindrops from clinging to the glass surface.
  - b. A pneumatic rain removal system is simply a mechanical windshield wiper system that is powered by pneumatic system pressure.
  - c. An air blast forms a barrier that prevents raindrops from striking the windshield surface.\*
23. What mixture may be used as a deicing fluid to remove frost from an aircraft surface?
  - a. Methyl ethyl ketone and ethylene glycol.
  - b. Ethylene glycol and isopropyl alcohol.\*
  - c. Naphtha and isopropyl alcohol.
24. Which of the following is the best means to use when removing wet snow from an aircraft?
  - a. Hot air.
  - b. Warm water.
  - c. A brush or a squeeze \*.
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 c. A brush or a squeeze.\*
35. What are three methods of anti icing aircraft windshields?  
 1. Blanket type heating system.  
 2. An electric heating element in the windshield.  
 3. Heated air circulating system.  
 4. Hot water system.  
 5. Windshield wipers and anti icing fluid.  
 6. Ribbon type heating system.  
 a. 2, 3, 4.  
 b. 2, 3, 5.\*  
 c. 1, 2, 6.
36. What icing condition may occur when there is no visible moisture present?  
 a. Injector ice.  
 b. Carburetor ice.\*  
 c. Inlet ice.
37. What should be used to melt the ice in a turbine engine if the compressor is immobile because of ice?  
 a. Anti icing fluid.                      b. Deicing fluid.  
 c. Hot air.\*
38. What is used as a temperature sensing element in an electrically heated windshield?  
 a. Thermometer.                      b. Thermistor.\*  
 c. Thermocouple.
4. What happens to the hot air used by a thermal anti-ice system after it has heated the surface?  
 Answer– The air is dumped (exhausted) overboard.
5. Why is it necessary to provide overheat protection for anti-icing systems that use turbine engine bleed air?  
 Answer– The air is hot enough to cause damage to the aircraft structure.
6. What are the effects of arcing on an electrically heated windshield?  
 Answer– Localized overheating and damage to the windshield.
7. Can the operation of an electrically heated pitot-tube be checked with the aircraft's ammeter, and if so, how?  
 Answer– Yes, turn the pitot heater on and observe the deflection of the ammeter needle.
8. Describe several potential problems associated with electrically heated windshields.  
 Answer– Arcing, delamination, scratches, and discoloration.
9. Why do some pneumatic deicer boot systems have an electrically operated timer?  
 Answer– To automatically cycle the boots, provide the proper rest time, and then recycle the boots.
10. What are the two common methods of inflating pneumatic deicer boots?  
 Answer– Bleed air from a turbine engine or the exhaust from an engine-driven vacuum pump.

### QUESTIONS AND ANSWERS

1. What controls the temperature in a thermal anti-icing system?  
 Answer– Hot and cold air are mixed.
2. What are the sources of heat for thermal anti-icing systems?  
 Answer– Bleed air from the compressor section of a turbine engine, engine exhaust heat exchangers and combustion heaters.
3. What prevents overheating of the leading edges of a thermal anti-ice system operated by engine bleed air?  
 Answer– Overheat sensors signal the anti-icing valves to close and shut off the hot air.
11. What procedure is used to hold deicer boots flat with the airfoil surface during flight?  
 Answer– Suction is applied to the boots.
12. Why do some deicer boot systems incorporate an oil separator?  
 Answer– If a wet pump system is used, the oil must be removed before it reaches the boots because oil damages the rubber.
13. What methods are used to attach a deicer boot to the leading edges of the wing and tail surfaces?  
 Answer– Adhesives, fairing strips and screws, or a combination of both.

14. What important step should be taken prior to making a cold-patch repair to a deicer boot?  
Answer— Consult the manufacturer’s services manual and follow the repair instructions explicitly.
15. Describe the method commonly used to remove rain from a windshield.  
Answer— Windshield wipers, a blast of air, or chemical rain repellent.
16. What power sources are used to operate windshield wipers?  
Answer— Electricity or hydraulic pressure.
17. Name two problems associated with in-flight operation of aircraft windshield wipers.  
Answer— Insufficient blade pressure caused by aerodynamic forces and failure to oscillate fast enough.
18. Describe the operation of a pneumatic rain removal system.  
Answer— A high velocity air blast prevents the rain from reaching the surface of the windshield.
19. What are the effects of spraying rain repellent on a dry windshield?  
Answer— It smears and streaks, which reduces visibility, and it is hard to remove when dry.
20. Where would you find information on the acceptable limits of windshield delamination?  
Answer— In reference material provided by the manufacturer.
3. In a freon vapor cycle cooling system, where is cooling air obtained for the condenser?  
a. Pressurized cabin air.  
b. Turbine engine compressor.  
c. Ambient air.\*
4. What is ventilating air used for on a combustion heater?  
a. Provides air required to support the flame.  
b. Carries heat to the places where needed.\*  
c. Provides combustion air for ground blower.
5. Turbine engine air used for air conditioning and pressurization is generally called  
a. ram air.  
b. compressed air.  
c. bleed air.\*
6. In the combustion heater, combustion air system, what prevents too much air from entering the heaters as air pressure increases?  
a. Only a differential pressure regulator can be used.  
b. Either a combustion air relief valve or a differential pressure regulator.\*  
c. Only a combustion air relief valve can be used.
7. The cabin pressure of an aircraft in flight is maintained at the selected altitude by  
a. controlling the air inflow rate.  
b. controlling the rate at which air leaves the cabin.\*  
c. inflating door seals and recirculating conditioned cabin air.
8. What controls the operation of the cabin pressure regulator?  
a. Cabin altitude.\*  
b. Bleed air pressure.  
c. Compressor air pressure.
9. The basic air cycle cooling system consists of  
a. heaters, coolers, and compressors.  
b. a source of compressed air, heat exchangers, and a turbine.\*  
c. ram air source, compressors, and engine bleeds.

## CABIN ATMOSPHERE CONTROL SYSTEMS

1. Which section of a turbine engine provides high pressure bleed air to an air cycle machine for pressurization and air-conditioning?  
a. C-D inlet compressor duct.  
b. Intel compressor.  
c. Turbine compressor.\*
2. At which component in an air cycle cooling system does air undergo a pressure and temperature drop?  
a. Expansion turbine.\*  
b. Primary heat exchanger.  
c. Refrigeration bypass valve.
10. The purpose of the dump valve in a pressurized aircraft is to relieve  
a. a negative pressure differential.  
b. pressure in excess of the maximum differential.  
c. all positive pressure from the cabin.\*
11. What component might possibly be damaged if liquid refrigerant is introduced into the low side of a vapor cycle cooling system when the pressure is too high or the outside air temperature is too low?  
a. Compressor.\*  
b. Condenser.  
c. Evaporator.

12. How can it be determined that a vapor cycle cooling system is charged with the proper amount of freon?
  - a. The compressor loads up and RPM decreases.
  - b. Air bubbles appear in the sight glass.
  - c. Air bubbles in the sight glass disappear.\*
13. When charging a vapor cycle cooling system after evacuation, the pressure gauge fails to come out of a vacuum. What is indicated?
  - a. The expansion valve failed to close.
  - b. Blockage in the system.\*
  - c. The compressor is not engaging.
14. What component in a vapor cycle cooling system would most likely be at fault if a system would not take a freon charge?
  - a. Expansion valve.\*
  - b. Condenser.
  - c. Receiver dryer.
15. Frost or ice buildup on a vapor cycle cooling system evaporator would most likely be caused by
  - a. moisture in the evaporator.
  - b. the mixing valve sticking closed.
  - c. inadequate airflow through the evaporator.\*
16. What test is used to determine the serviceability of an oxygen cylinder?
  - a. Pressure test with water.\*
  - b. Pressure test with nitrogen.
  - c. Pressure test with manometer.
17. How often should standard weight high pressure oxygen cylinders be hydrostatically tested?
  - a. Every 4 years.
  - b. Every 3 years.
  - c. Every 5 years.\*
18. To be eligible for recharging, a Dot 3HT oxygen cylinder must have been hydrostatically tested every three years and be retired from service after
  - a. 15 years or 10 000 filling cycles.
  - b. 24 years or 43890 filling cycles.\*
  - c. 10 years or 5000 filling cycles.
19. What type of oxygen system uses the rebreather bag-type mask?
  - a. Demand.
  - b. Diluter demand.
  - c. Continuous flow.\*
20. The altitude controller maintains cabin altitude by modulation of the
  - a. outflow valve.\*
  - b. safety valve.
  - c. safety and outflow valves.
21. Hot compressor bleed air operates the conditioned air system on some turbine aircraft, how is cold air supplied?
  - a. By the ram cycle cooling unit.
  - b. By the flow control unit.
  - c. By air cycle machine turbine.\*
22. For use in pressurized aircraft, which is generally the least complicated and requires the least maintenance?
  - a. High-pressure oxygen systems.
  - b. Low-pressure oxygen systems.
  - c. Chemical oxygen generator systems.\*
23. The main cause of contamination in gaseous oxygen systems is
  - a. moisture.\*
  - b. dust and other airborne particulates.
  - c. other atmospheric gases.
24. Where does the last stage of cooling in an air cycle air conditioning system occur?
  - a. Secondary heat exchanger.
  - b. Refrigeration unit compressor.
  - c. Expansion turbine.\*
25. The point at which freon flowing through a vapor cycle cooling system gives up heat and changes from a gas to a liquid is the
  - a. expansion valve.
  - b. evaporator.
  - c. condenser.\*
26. The point at which freon flowing through a vapor cycle cooling system absorbs heat and changes from a liquid to a gas is the
  - a. condenser.
  - b. expansion valve.
  - c. evaporator.\*
27. How is the cabin pressure of a pressurized aircraft usually controlled?
  - a. By an automatic outflow valve that dumps all the pressure in excess of the amount for which it is set.\*
  - b. By a pressure sensitive valve that controls the output pressure of the pressurization pump.
  - c. By a pressure sensitive switch that causes the pressurization pump to turn on or off as required.
28. Which is considered a good practice concerning the inspection on heating and exhaust systems of aircraft utilizing a jacket around the engine exhaust as a heat source?
  - a. Supplement physical inspecting with periodic operational carbon monoxide detection tests.\*
  - b. All exhaust system components should be removed periodically, and their condition determined by the magnetic particle inspection method.
  - c. All exhaust system components should be removed and replaced at each 100-hour inspection period.
29. On some cabin pressurization systems, pressurization on the ground is restricted by the
  - a. main landing gear operated switch.\*
  - b. negative pressure-relief valve.
  - c. cabin pressure regulator.

30. The cabin pressure control setting has a direct influence upon the
- outflow valve opening.\*
  - pneumatic system pressure.
  - inflow valve opening.
31. The function of the evaporator in a freon cooling system is to
- lower the temperature of the cabin air.\*
  - transfer heat from the freon gas to ambient air.
  - liquify freon in the line between the compressor and the condenser.
32. What is the purpose of a mixing valve in a compressor bleed air air-conditioning system?
- Distribute conditioned air evenly to all parts of the cabin.
  - Combine ram air with conditioned air.
  - Control the supply of hot, cool, and cold air.\*
33. What component of a pressurization system prevents the cabin altitude from becoming higher than airplane altitude?
- Negative pressure relief valve.\*
  - Cabin rate of descent control.
  - Positive pressure relief valve.
34. If the liquid level gauge in a vapor cycle cooling system indicates a low freon charge, the system should
- be operated and a pressure check performed.
  - not be operated until freon and oil have been added.
  - be operated for a period of time to reach a stable condition and then the freon level rechecked.\*
35. If the cabin rate of climb is too great, the control should be adjusted to cause the
- cabin compressor speed to decrease.
  - outflow valve to close slower.
  - outflow valve to close faster.\*
36. The position of the thermostatic expansion valve in a vapor cycle cooling system is determined by temperature and pressure of the
- freon entering the evaporator.
  - freon in the outlet of the evaporator.\*
  - air in the outlet of the condenser.
37. The function of the condenser in a freon cooling system is to
- transfer heat from the freon gas to ambient air.\*
  - charge liquid freon into a gas before it enters the compressor.
  - transfer heat from the cabin air to the liquid freon.
38. The function of an expansion valve in a freon cooling system is to act as metering device and to
- reduce the pressure of the gaseous freon.
  - increase the pressure of the liquid freon.
  - reduce the pressure of the liquid freon.\*
39. Which prevents a sudden loss of pressurization in the event that there is a loss of the pressurization source?
- Firewall shutoff valve.
  - Cabin pressure outflow valve.
  - Delivery air duct check valve.\*
40. When servicing an air conditioning system that has lost all of its freon it is necessary to
- check oil and add as necessary, evacuate the system, relieve vacuum, and add freon.
  - check oil and add as necessary, evacuate the system, and add freon.\*
  - check oil and add as necessary, and add freon.
41. The primary function of the cabin pressurization system outflow valve is to
- maintain the same cabin air pressure at all altitudes.
  - maintain the desired cabin pressure.\*
  - provide protection against over pressurization.
42. One purpose of a jet pump in a pressurization and air conditioning system is to
- produce a high pressure for operation of the outflow valve.
  - provide for augmentation of airflow in some areas of the aircraft.\*
  - assist in the circulation of freon.
43. After cleaning or replacing the filtering element in a combustion heater fuel system, the system should be pressurized and
- a sample of fuel taken downstream from the filter to ensure proper operation of the new filtering element.
  - the fuel filter bypass valve reset to the filter position.
  - all connections checked for leaks.\*
44. The operation of an aircraft combustion heater is usually controlled by a thermostat circuit which
- measures the amount of fuel continuously entering the heater and therefore regulates the heater's BTU output.
  - alternately turns the fuel on and off, a process known as cycling.\*
  - regulates the voltage applied to the heater's ignition transformer.
45. The air cycle cooling system produces cold air by
- passing air through cooling coils that contain a refrigerant.
  - extracting heat energy across a compressor.
  - extracting heat energy across an expansion turbine.\*
46. (Refer to figure 9.38.) Determine what unit is located immediately downstream of the expansion valve in a freon refrigeration system.
- Condenser.
  - Compressor.
  - Evaporator coils.\*

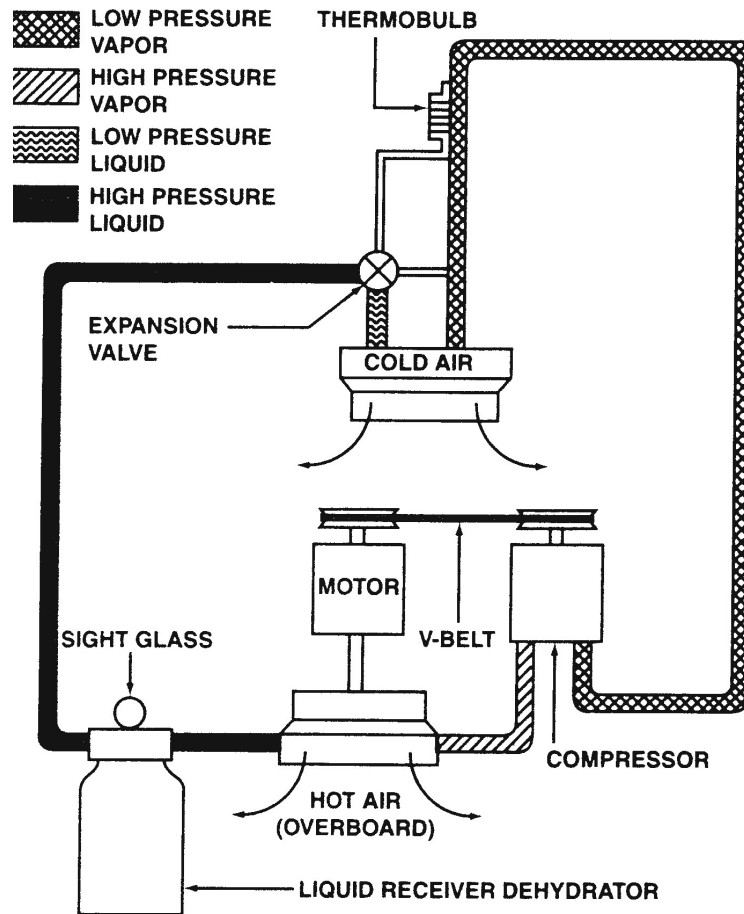


Figure 9.38.

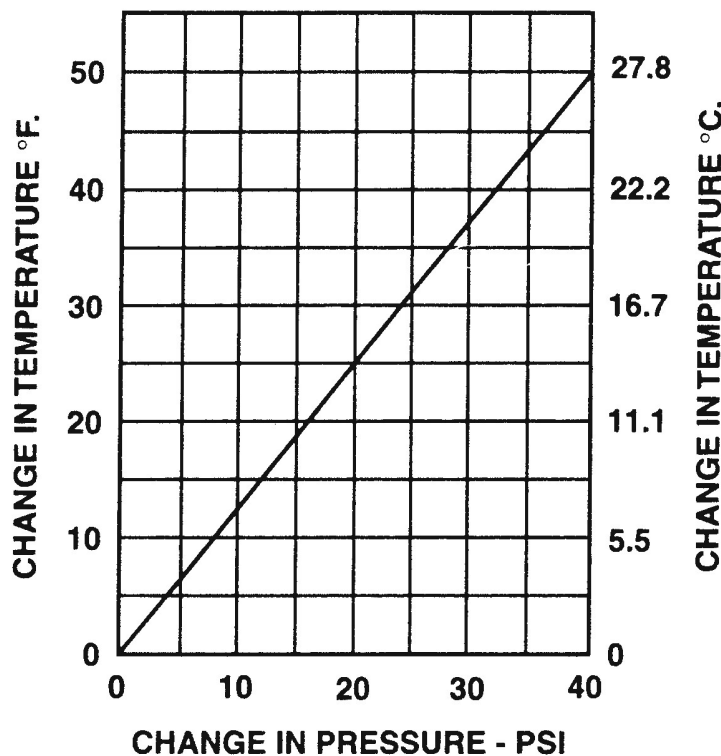
47. When checking a freon system, a steady stream of bubbles in the sight gauge indicates the charge is
  - a. correct.
  - b. high.
  - c. low.\*
48. An aircraft pressurization cycle is normally considered to be
  - a. one take off and one landing.
  - b. when the fuselage reaches its maximum pressure differential one time.
  - c. one complete series of events of operations that recur regularly.\*
49. Which best describes cabin differential pressure?
  - a. Difference between the ambient and internal air pressure.\*
  - b. Difference between cabin pressure controller setting and actual cabin pressure.
  - c. Difference between cabin flight altitude pressure and Mean Sea Level pressure.
50. Composite oxygen bottles that conform to DOT-E-8162 have a service life of
  - a. 10 years or 5000 filling cycles whichever occurs first.
  - b. 5 years or 5000 filling cycles whichever occurs first.
  - c. 15 years or 10 000 filling cycles whichever occurs first.\*
51. The cabin pressurization modes of operation are
  - a. ambient, unpressurized and isobaric.
  - b. differential, unpressurized and isobaric.\*
  - c. isobaric, differential, and maximum differential.
52. (1) Usually bleed air from a gas-turbine engine compressor can be safely used for cabin pressurization.  
 (2) Independent cabin condition air machines (air cycle machine) can be powered by bleed air from an aircraft turbine engine compressor.  
 Regarding the above statements,
  - a. only No. 1 is true.
  - b. both No. 1 and No. 2 are true.\*
  - c. only No. 2 is true.
53. A pressurization controller uses
  - a. barometric pressure, cabin altitude, and cabin rate of change.\*
  - b. bleed air pressure, outside air temperature, and cabin rate of climb.
  - c. cabin rate of climb, bleed air volume, and cabin pressure.
54. Which unit in a vapor cycle cooling system serves as a reservoir for the refrigerant?
  - a. Evaporator.
  - b. Receiver dryer.\*
  - c. Condenser.

55. What is the condition of the refrigerant as it enters the evaporator of a vapor cycle cooling system?
- High pressure vapor.
  - Low pressure liquid.\*
  - High pressure liquid.
56. The evacuation of a vapor-cycle cooling system removes any water that may be present by
- raising the boiling point of the water by drawing out the vapor.
  - drawing out the liquid.
  - lowering the boiling point of the water and drawing out the vapor.\*
57. What is the condition of the refrigerant as it leaves the evaporator of a vapor cycle cooling system?
- Low pressure liquid.
  - High pressure vapor.
  - Low pressure vapor.\*
58. What is the condition of the refrigerant as it leaves the condenser of a vapor cycle cooling system?
- Low pressure liquid.
  - High pressure vapor.
  - High pressure liquid.\*
59. In what position should the bottle be placed when adding liquid freon to a vapor cycle cooling system?
- Vertical with the outlet at the bottom.
  - Horizontal with the outlet to the side.
  - Vertical with the outlet at the top.\*
60. When purging a freon air conditioning system, it is important to release the charge at a slow rate. What is the reason for the slow rate discharge?
- Prevent excessive loss of refrigerant oil.\*
  - Prevent condensation from foaming and contaminating the system.
  - Prevent the large amount of freon from contaminating the surrounding atmosphere.
61. When a vapor cycle cooling system is not in operation, what is an indication that the system is leaking freon?
- An ozone-like odor in the immediate area.
  - Bubbles in the sight glass.
  - Oil seepage.\*
62. In an operating vapor cycle cooling system, if the two lines connected to the expansion valve are essentially at the same temperature, what does this indicate?
- The expansion valve is not metering freon properly.\*
  - The compressor is pumping too much refrigerant.
  - The system is functioning normally.
63. The purpose of a subcooler in a vapor cycle cooling system is to
- aid in quick cooling of a hot aircraft interior.
  - augment the cooling capacity during periods of peak demand.
  - cool the freon to prevent premature vaporization\*.
64. (1) A small amount of a water in a vapor cycle cooling system can freeze in the receiver-dryer and stop the entire system operation.  
(2) Water in a vapor cycle cooling system will react with refrigerant to form hydrochloric acid which is highly corrosive to the metal in the system.  
Regarding the above statements,
- only No. 1 is true.
  - both No. 1 and No. 2 are true.
  - only No. 2 is true.\*
65. When Refrigerant 12 is passed over an open flame, it
- is broken down into its basic chemical elements.
  - changes to methane gas.
  - changes to phosgene gas.\*
66. What type of oil is suitable for use in vapor-cycle cooling system?
- Low viscosity engine oil with the inability to absorb water.
  - Highly refined synthetic oil, free from impurities with special water absorbing additives.
  - Special high grade refrigeration oil.\*
67. When an aircraft's oxygen system has developed a leak, the lines and fittings should be
- removed and replaced.
  - bubble tested with a special soap solution manufactured specifically for this purpose.\*
  - inspected using a special oxygen system dye penetrant.
68. If oxygen bottle pressure is allowed to drop below a specified minimum, it may cause
- moisture to collect in the bottle.\*
  - the pressure reducer to fail.
  - the automatic altitude control valve to open.
69. What controls the amount of oxygen delivered to a mask in a continuous flow oxygen system?
- Calibrated orifice.\*
  - Pilot's regulator.
  - Pressure reducing valve.
70. In the diluter demand oxygen regulator, when does the demand valve operate?
- When the user breathes.\*
  - When the user demands 100 percent oxygen.
  - When the diluter control is set at normal.
71. The primary difference between aviation breathing oxygen and most other types of commercially available compressed oxygen is that
- aviation breathing oxygen has had all the water vapor removed.\*
  - the other types are usually somewhat less than 99.5 percent pure oxygen.
  - aviation breathing oxygen has a higher percentage of water vapor to help prevent drying of a person's breathing passages and possible dehydration.



72. What is used in some oxygen system to change high cylinder pressure to low system pressure?
- Pressure reducer valve.\*
  - Calibrated fixed orifice.
  - Diluter demand regulator.
73. In a high-pressure oxygen system, if the pressure reducer fails, what prevents high pressure oxygen from entering the system downstream?
- Manifold control valve.
  - Check valve.
  - Pressure relief valve.\*
74. High pressure cylinders containing oxygen for aviation use can be identified by their
- green color and the words "AVIATOR'S BREATHING OXYGEN" stenciled in 1-inch white letters.\*
  - yellow color and the words "AVIATOR'S BREATHING OXYGEN" stenciled in 1-inch white letters.
  - green color and the words "BREATHING OXYGEN" stenciled in 1-inch white letters.
75. (Refer to figure 9.39) One hour after an oxygen system was charged for a leakage check, the oxygen pressure gauge read 460 PSI at 63 °F; 6 hours later the temperature was 51 °F. (A 5 PSI change is the maximum allowable in a 6-hour period). What pressure gauge readings would be acceptable to remain within the allowable limits?
- 445 to 450 PSI.
  - 446 to 450 PSI.\*
  - 455 to 460 PSI.
76. An aircraft oxygen bottle may be considered airworthy if it has been hydrostatically tested and identified
- with the DOT number and manufacturer stamped on the cylinder near the neck.
  - with the DOT number, serial number and manufacturer stamped on the cylinder near the neck.
  - with the test date, DOT number and serial number stamped on the cylinder near the neck.\*

**PRESSURE TEMPERATURE CORRECTION CHART**



Correction of pressure during leakage test for change in temperature. Add pressure change if temperature rises. Subtract pressure change if temperature falls.

Figure 9.39 Pressure Temperature Correction Chart

77. In a gaseous oxygen system, which of the following are vented to blow out plugs in the fuselage skin?  
 a. Filler shutoff valves.  
 b. Pressure relief valves.\*  
 c. Pressure reducer valves.
78. The purpose of pressurizing aircraft cabins is to  
 (1) create the proper environment for prevention of hypoxia.  
 (2) permit operation at high altitudes.  
 Regarding the above statements,  
 a. both No. 1 and No. 2 are true.\*  
 b. only No. 2 is true.  
 c. only No. 1 is true.
79. (1) Oxygen used in aircraft systems is at least 99.5 percent pure and is practically water free.  
 (2) Oxygen used in aircraft systems is 99.5 percent pure and is hospital quality.  
 a. both No. 1 and No. 2 are true.  
 b. only No. 1 is true.\*  
 c. neither No. 1 nor No. 2 is true.
80. Oxygen systems in unpressurized aircraft are generally of the  
 a. pressure demand type only.  
 b. continuous flow and pressure demand types.\*  
 c. portable bottle type only.
81. The purpose of the airflow metering aneroid assembly found in oxygen diluter demand regulators is to  
 a. automatically put the regulator in emergency position if the demand valve diaphragm ruptures.  
 b. regulate airflow in relation to cabin altitude when in diluter demand position.\*  
 c. regulate airflow in relation to oxygen flow when operating in emergency or diluter demand positions.
82. If a high pressure oxygen cylinder is to be installed in an airplane, it must meet the specifications of the  
 a. aircraft manufacturer or the cylinder manufacturer.  
 b. National Transportation Safety Board or the Standards of Compressed Gas Cylinders.  
 c. Department of Transportation.\*
83. Before a high pressure oxygen cylinder is serviced, it must be the correct type and have been  
 a. hydrostatically tested within the proper time interval.\*  
 b. approved by the National Transportation Safety Board.  
 c. inspected by a certificated airframe mechanic.
84. A contaminated oxygen system is normally purged with  
 a. compressed air.  
 b. nitrogen.  
 c. oxygen.\*
85. How should you determine the amount of oxygen in a portable, high pressure cylinder?  
 a. Read the pressure gauge mounted on the cylinder.\*  
 b. Measure the pressure at the mask.  
 c. Weight the cylinder and its contents.
86. What may be used as a lubricant on oxygen system tapered pipe thread connections?  
 a. Glycerine.  
 b. Teflon tape.\*  
 c. Silicon dielectric compound.
87. On transport category aircraft what might be an indication of an over pressure event of the aircraft oxygen system?  
 a. The green thermal expansion disk in the cockpit missing.  
 b. The green thermal expansion disk on the oxygen regulator missing.  
 c. The green thermal expansion disk missing.\*
88. Which of the following are characteristic of a chemical or solid state oxygen system?  
 1. An adjustable oxygen release rate.  
 2. A volume storage capacity about three times that of compressed oxygen.  
 3. The system generators are inert below 400 °F even under severe impact.  
 4. A distribution and regulating system similar to gaseous oxygen systems.  
 a. 2 & 3.\*  
 b. 1 & 2.  
 c. 3 & 4.

#### QUESTIONS AND ANSWERS

1. Is there any special requirement as to the type of oxygen used in an aircraft system, and if so, what is it?

Answer— Only aviator's breathing oxygen should be used.

2. Describe the operating principle of a continuous-flow oxygen system.

Answer— High-pressure oxygen flows from the storage cylinder to a pressure regulator where its pressure is reduced and then to the mask outlets whenever the system is turned on.

3. Describe the operating principle of a pressure-demand oxygen system.

Answer— Demand systems allow oxygen to flow from the cylinder to the regulator and then to the mask only when the user inhales. Pressure-demand systems provide oxygen to the mask at higher than atmospheric pressure when use at extremely high altitudes, forcing oxygen into the user's lungs.

4. What should be used to purge an oxygen system of moisture?  
Answer– Oxygen, dry air, or dry nitrogen.
5. What action must be taken when an oxygen system has been open to the atmosphere?  
Answer– The system must be purged of any moisture.
6. Describe the safety precautions that should be observed when servicing oxygen systems.  
Answer– Avoid all contact with petroleum-based oil or grease, don't smoke, keep every thing very clean, service systems outdoors if at all possible, and keep the caps on the bottles to protect the valves.
7. What is a Roots blower?  
Answer– A type of engine-driven compressor.
8. Name two different types of independent cabin air compressors?  
Answer– Positive-displacement and centrifugal.
9. What is the source of pressurization air in most jet aircraft?  
Answer– Engine bleed air.
10. What device provides the principle means of controlling cabin pressure?  
Answer– The outflow valve.
11. What unit regulates the position of an outflow valve?  
Answer– The cabin pressure controller.
12. Name several methods used on reciprocating-engine aircraft for providing heated cabin air.  
Answer– Exhaust shroud head exchangers, combustion heaters, and electric heaters.
13. What is the function of the ventilating air in a combustion heater?  
Answer– Ventilating air transports the heat from the heater into the cabin and prevents combustion gases from entering the cabin if the combustion chamber develops a crack.
14. What are the sources of ventilating air in a combustion heater?  
Answer– Ram air in flight, a blower on the ground, or possibly a compressor if the air plane is pressurized.
15. Name the basic components of an air-cycle cooling system.  
Answer– The compressor and expansion turbine, heat exchangers, and various valves.
16. Describe the basic operating principles that allow an air-cycle system to produce cool air.  
Answer– Hot engine bleed air is cooled in the primary heat exchanger, compressed, then cooled again in the secondary heat exchanger. This air is expanded across the turbine where energy is extracted and the pressure is reduced. This produces a large temperature drop.
17. Describe the basic operating principles of a water separator.  
Answer– Cool, moist air is swirled so that water droplets are separated by centrifugal force, captured by a cock, and drained.
18. Name the principle components of a vapor-cycle system.  
Answer– A compressor, condenser, expansion valve, and an evaporator.
19. In what significant way is a vapor-cycle cooling system different from an air-cycle system?  
Answer– Vapor-cycle systems use a refrigerant liquid, usually Freon.
20. Why is oil added to the refrigerant in a vapor-cycle air conditioning system?  
Answer– To lubricate the compressor.

## AIRCRAFT FUEL SYSTEMS

1. Fuel jettisoning is usually accomplished
  - a. by gravity flow into the outboard wing tanks and overboard through a common outlet in each wing.
  - b. through individual outlets for each tank.
  - c. through a common manifold and outlet in each wing.\*
2. the primary purpose of an aircraft's fuel jettison system is to quickly achieve a
  - a. lower landing weight.\*
  - b. reduced fire hazard.
  - c. balanced fuel load.
3. (1) The fuel jettison valve must be designed to allow flight personnel to close the valve during any part of the jettisoning operation.  
(2) During the fuel jettisoning operation, the fuel must discharge clear of any part of the airplane.
  - a. neither No. 1 nor No. 2 is true.
  - b. both No. 1 and No. 2 are true.\*
  - c. only No. 2 is true.

4. Which of the following is employed to maintain lateral stability when jettisoning fuel?
  - a. Crossfeed system.
  - b. Two interconnected systems.
  - c. Two separate independent systems.\*
5. A fuel jettison system is required under certain conditions if the maximum takeoff weight exceeds the maximum landing weight. What regulations cover the requirements of fuel jettisoning?
  - a. Federal Aviation Regulation Part 43 and 91.
  - b. Federal Aviation Regulation Part 23, 25 and CAM\* 4b.
  - c. Federal Aviation Regulation Part 21, 43 and CAM 8.
6. Fuel is moved overboard in most fuel jettison systems by
  - a. gravity.
  - b. boost pumps.\*
  - c. gravity and engine driven fuel pumps.
7. Fuel jettisoning past the limits prescribed by Federal Aviation Regulations is usually prevented by
  - a. dump limit valves or a low-level circuit.\*
  - b. standpipes in the fuel tanks.
  - c. closely monitoring the fuel quantity and turning off the fuel dump switch(s).
8. Which procedure must be followed when defueling aircraft with sweptback wings?
  - a. Defuel all the tanks at one time.
  - b. Defuel the outboard wing tanks first.\*
  - c. Defuel the inboard wing tanks first.
9. (Refer to figure 9.40) What is the purpose of the pump crossfeed valve?
  - a. Balance the fuel in the tanks.\*
  - b. Allow operation of engines from one tank.
  - c. Allow operation of the left engine when the right fuel boost pump is inoperative.
10. Normal fuel cross-feed system operation in multiengine aircraft
  - a. reduces contamination and/or fire hazards during fueling or defueling operations.
  - b. provides a means of maintaining a balanced fuel load condition.\*
  - c. calls for jettisoning of fuel overboard to correct lateral instability.
11. What is the primary purpose of the crossfeed system?
  - a. To provide automatic refueling of a tank to any desired level.
  - b. To allow the feeding of any engine from any tank.\*
  - c. To allow the feeding of fuel from one tank for defueling.
12. Fuel system components must be bonded and grounded in order to
  - a. retard galvanic corrosion.
  - b. drain off static charges.\*
  - c. prevent stray currents.
13. A typical large transport aircraft fuel manifold system allows how many of the following?
  1. All tanks can be serviced through a single connection.
  2. Any engine can be fed from any tank.
  3. All engines can be fed from all tanks simultaneously.
  4. A damaged tank can be isolated from the rest of the fuel system.
  - a. Three.
  - b. Two.
  - c. Four.\*
14. The use of turbine fuels in aircraft has resulted in some problems not normally associated with aviation gasoline. One of these problem is
  - a. microbial contaminants.\*
  - b. increasing viscosity of fuel as fuel temperature lowers at altitude.
  - c. higher vapor pressure.

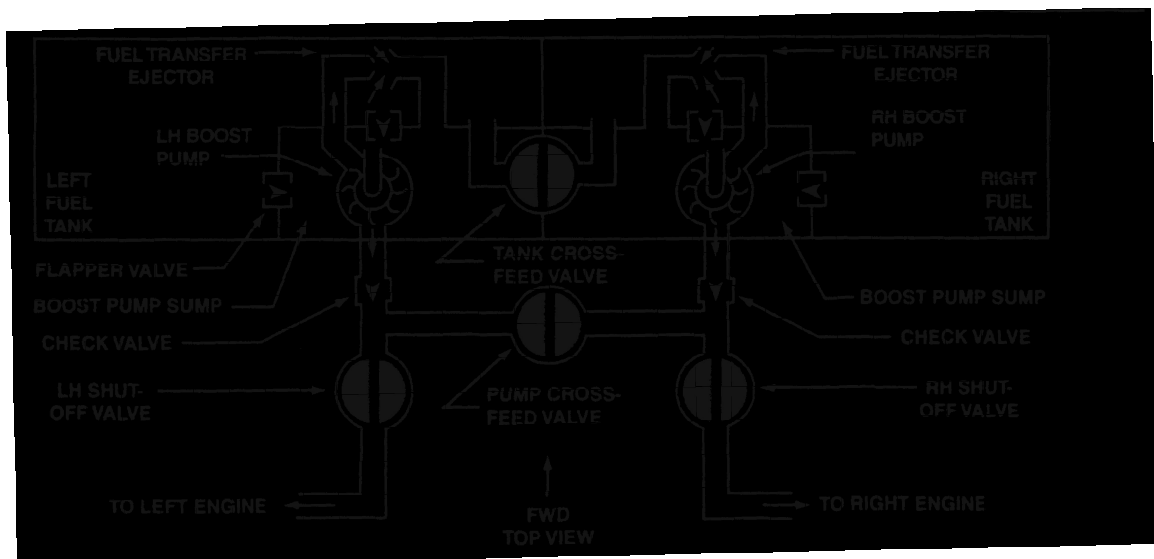


Figure 9.40 Fuel System

15. What is used in many aircraft to prevent bubbles in the fuel after it leaves the tank when atmospheric pressure is lower than fuel vapor pressure?
  - a. Air fuel separators
  - b. Boost pumps.\*
  - c. Anti-foaming additives.
16. How is the outlet fuel pressure regulated on a submerged, single speed, centrifugal type fuel pump?
  - a. By the first check valve downstream from the pump.
  - b. By the pump's design and internal clearances.\*
  - c. By the engine driven pump's design and internal clearance.
17. What is one purpose of a fuel tank vent?
  - a. To decrease tank internal air pressure.
  - b. To decrease fuel vapor pressure.
  - c. To maintain atmospheric pressure.\*
18. When inspecting a removable rigid fuel tank for leaks, what procedure should be followed?
  - a. pressurize the tank with air and submerge in water to locate leaks.
  - b. pressurize the tank with air and brush with soapy water.\*
  - c. fill the tank with water and pressurize with air and brush with soapy water.
19. It is necessary to enter an aircraft's fuel tanks, which procedure should be avoided?
  - a. Conduct the defueling and tank purging operation in an air conditioned building.\*
  - b. Continue purging the tank during the entire work period.
  - c. Station an assistant outside the fuel tank access to perform rescue operations if required.
20. What is the recommended practice for cleaning a fuel tank before welding?
  - a. Steam clean the tank interior.\*
  - b. Flush the inside of the tank with clean water.
  - c. Purge the tank with air.
21. An aircraft's integral fuel tank is
  - a. a part of the aircraft structure.\*
  - b. usually located in the bottom of the fuselage.
  - c. a self sealing tank.
22. Which gas is used for purging an aircraft fuel tank?
  - a. Carbon monoxide.
  - b. Helium or argon
  - c. Carbon dioxide.\*
23. Why is the main fuel strainer located at the lowest point in the fuel system?
  - a. It filters and traps all micro-organisms that may be present in the fuel system.
  - b. It provides a drain for residual fuel.
  - c. it traps any small amount of water that may be present in the fuel system.\*
24. The purpose of a diaphragm in a vane type fuel pump is to
  - a. compensate fuel pressures to altitude changes.\*
  - b. vary fuel pressure according to throttle setting.
  - c. equalize fuel pressure at all speeds.
25. When moving the mixture control on a normally operating engine into the idle cutoff position, engine RPM should
  - a. slightly increase before the engine starts to die.\*
  - b. remain the same until the cut off is effected, then drop rapidly.
  - c. slightly decrease and then drop rapidly.
26. Entrapped water in aviation turbine fuel is a hazard because of its susceptibility to freezing as it passes through the filters. What are common methods of preventing this hazard?
  - a. Micromesh fuel strainers and fuel heater.
  - b. Anti-icing fuel additives and fuel heater.\*
  - c. High-velocity fuel pumps and fuel heater.
27. Fuel leaks are usually classified as a stain, a seep, a heavy seep, or a running leak. As a general rule,
  - a. stains, seeps, and heavy seeps are not flight hazards.
  - b. all fuel leaks regardless of location or severity are considered a hazard to flight.
  - c. stains, seeps, and heavy seeps, (in addition to running leaks) are considered flight hazards when located in unvented areas of the aircraft.\*
28. The presence of fuel stains around a fuel nozzle would indicate
  - a. clogged fuel nozzle.\*
  - b. excessive airflow across the venturi.
  - c. too much fuel pressure.
29. What should be used to inert an integral fuel tank before attempting repairs?
  - a. CO<sub>2</sub>.\*
  - b. Steam.
  - c. Water.
30. What should be used to remove flux from an aluminum tank after welded repairs?
  - a. Soft brush and warm water.
  - b. 5 percent solution of nitric or sulfuric acid.\*
  - c. Mild solution of soap and warm water.
31. What method would be used to check for internal leakage of a fuel valve without removing the valve from the aircraft?
  - a. Apply regulated air pressure on the downstream side of the fuel pump and listen for air passing through the valve.
  - b. Place the valve in the OFF position, drain the strainer bowl, and with boost pump on, watch to see if fuel flows to the strainer bowl.\*
  - c. Remove fuel cap(s), turn boost pumps(s) on, and watch for bubbling in the tanks.

32. Why are jet fuels more susceptible to water contamination than aviation gasoline?
- Jet fuel is lighter than gasoline; therefore, water is more easily suspended.
  - Condensation is greater because of the higher volatility of jet fuels.
  - Jet fuel has a higher viscosity than gasoline.\*
33. When installing a rigid fuel line, 1/2 inch in diameter, at what intervals should the line be supported?
- 12 inches.
  - 16 inches.\*
  - 24 inches.
34. The probe of a capacitance type fuel level gauge is essentially a
- float actuated variable capacitor.
  - capacitor with fuel and air acting as one plate.
  - capacitor with fuel and air acting as a dielectric.\*
35. The capacitance type (electronic) fuel quantity indicator
- has no moving parts in the tank.\*
  - has two tubes separated by a mica dielectric in the tank.
  - utilizes a float operated variable capacitor.
36. What type of remote reading fuel quantity indicating system has several probes installed in each fuel tank?
- Direct reading.
  - Electromechanical.
  - Electronic.\*
37. Which aircraft fuel quantity indicating system incorporates a signal amplifier/
- Electrical.
  - Sight glass.
  - Electronic.\*
38. A drip gauge may be used to measure
- the amount of fuel in the tank.\*
  - system leakage with the system shut down.
  - fuel pump diaphragm leakage.
39. The electronic type fuel quantity indicating system consist of a bridge circuit,
- an amplifier, an indicator, and a tank unit.\*
  - a tank, an amplifier, and an indicator.
  - a tank unit, a tank, and an amplifier.
40. A probe or a series of probes is used in what kind of fuel quantity indicating system?
- Capacitor.\*
  - Synchro.
  - Selsyn.
41. Why is the capacitance fluid quantity indicating system more accurate in measuring fuel level than a mechanical type?
- It measures by weight instead of volume.\*
  - Only one probe and one indicator are necessary for multiple tank configurations.
  - It measures in gallons and converts to pounds.
42. One advantages of electrical and electronic fuel quantity indicating systems is that
- the indicators are calibrated in gallons; therefore, no conversion is necessary.
  - only one transmitter and one indicator are needed regardless of the number of tanks.
  - several fuel tank levels can be read on one indicator.\*
43. A fuel totalizer is a component which indicates the
- total amount of fuel being consumed by all engines.
  - amount of fuel in any given tank.
  - amount of fuel in all tanks.\*s
44. What is the dielectric (nonconducting material) in a capacitance type fuel quantity indicating system?
- Outer shell of the capacitor.
  - Fuel in the tank.
  - Fuel and air in the tank.\*
45. A capacitance type fuel quantity indicating system measures fuel in
- pounds per hour.
  - pounds.\*
  - gallons.
46. What are the four general types of fuel quantity gauges?
- Sight glass.
  - Mechanical.
  - Electrical.
  - Electronic.
  - Bourdon tube.
  - Vane type transmitter.
  - Litmus indicator.
  - Direct reading static pressure type.
- 2, 3, 5, 7.
  - 1, 3, 6, 8.
  - 1, 2, 3, 4.\*
47. How does temperature affect fuel weight?
- Warm fuel is heavier per gallon.
  - Temperature has no effect.
  - Cold fuel is heavier per gallon.\*
48. One advantage of electrical and electronic fuel quantity indicating systems is that the indicator.
- can be located any distance from the tank(s).\*
  - always measures volume instead of mass.
  - has no movable devices.
49. When fuel quantity is measured in pounds instead of gallons, the measurement will be more accurate because fuel volume
- increases when temperature decreases.
  - varies with temperature change.\*
  - varies with changes in atmospheric pressure.
50. An electrical type fuel quantity indicating system consists of an indicator in the cockpit and a
- float operated transmitter installed in the tank.\*
  - float operated receiver installed in the tank.
  - float resting on the surface of the tank.

51. What is the purpose of a float operated transmitter installed in a fuel tank?
- It sends an electric signal to the fuel quantity indicator.\*
  - It senses the dielectric qualities of fuel and air in the tank.
  - It senses the total amount of fuel density.
52. In an electronic type fuel quantity indicating system, the tank sensing unit is a
- variable resistor.
  - capacitor.\*
  - variable inductor.
53. What must each fuel quantity indicator be calibrated to read during level flight when the quantity of fuel remaining is equal to the unusable fuel supply?
- Zero.\*
  - Both the total unusable fuel quantity and the unusable fuel quantity in the each tank.
  - The total unusable fuel quantity.
54. What unit would be adjusted to change the fuel pressure warning limits?
- Fuel pressure relief valve.
  - Fuel flowmeter bypass valve.
  - Pressure sensitive mechanism.\*
55. Select one means of controlling the fuel temperature on turbine-powered aircraft.
- Engine bleed air to the fuel filter.
  - Engine bleed air to a heat exchanger.\*
  - Engine bleed air to the fuel tank.
56. What is the purpose of flapper type check valves in integral fuel tanks?
- To allow the engine driven pumps to draw fuel directly from the tank if the boost pump fails.
  - To prevent fuel from flowing away from the boost pumps.\*
  - To allow defueling of the tanks by suction.
57. What unit is generally used to actuate the fuel pressure warning system?
- Pressure sensitive mechanism.\*
  - Fuel pressure gauge.
  - Fuel flowmeter.
58. What method is used on turbine powered aircraft to determine when the condition of the fuel is approaching the danger of forming ice crystals?
- Fuel temperature indicator.\*
  - Fuel pressure gauge.
  - Fuel pressure warning.
59. Which of the following would give the first positive indication that a change over from one fuel tank to another is needed?
- Fuel quantity indicator.
  - Fuel pressure gauge.
  - Fuel pressure warning.\*
60. A fuel pressure warning switch contacts close and warning light is turned on when
- the fuel flow stops.
  - the fuel pressure drops below specified limits.\*
  - a measured quantity of fuel has passed through it.
61. A transmitter in a fuel pressure warning system serves what function?
- Transmits an electrical signal to fluid pressure.
  - Transmits fluid pressure directly to the indicator.
  - Converts fluid pressure to an electrical signal.\*
62. Where is fuel pressure taken for the pressure warning signal on most aircraft engines?
- Between the fuel pump and the strainer.
  - Fuel pressure line of the carburettor \*
  - Outlet side of the boost pump.
63. Which of the following is necessary to effectively troubleshoot a fuel pressure warning system?
- A set of Federal Aviation Regulations.
  - The manufacturers's maintenance manuals.\*
  - AC 43.13-1A, Acceptable Methods, Techniques, and Practices 3/4 Aircraft Inspection and Repair.
64. Which of the following would be most useful to locate and troubleshoot an internal fuel leak in an aircraft fuel
- Illustrated parts manual.
  - Aircraft structure repair manual.
  - A fuel system schematic.\*
65. In some aircraft with several fuel tanks, the possible danger of allowing the fuel supply in one tank to become exhausted before the selector valve is switched to another tank is prevented by the installation of
- a fuel pressure warning signal system.\*
  - an engine fuel pump bypass valve.
  - a fuel pressure relief valve.
66. (1) The function of a fuel heater is to protect the engine fuel system from ice formation.  
(2) An aircraft fuel heater cannot be used to thaw ice in the fuel screen.  
Regarding the above statements,
- only No. 1 is true.\*
  - both No. 1 and 2 are true.
  - only No. 2 is true.
67. (1) Gas turbine engine fuel systems are very susceptible to the formation of ice in the fuel filters.  
(2) A fuel heater operates as a heat exchanger to warm the fuel.  
Regarding the above statements.
- only No. 1 is true.
  - only No. 2 is true.
  - both No. 1 and No. 2 are true.\*

68. (1) A fuel heater can use engine bleed air as a source of heat.  
(2) A fuel heater can use engine lubricating oil as a source of heat  
Regarding the above statements.  
a. both No. 1 and No. 2 are true.\*  
b. only No. 1 is true.  
c. neither No. 1 nor No. 2 is true.
69. (1) A fuel pressure gauge is a differential pressure indicator.  
(2) A fuel pressure gauge indicates the pressure of the fuel entering the carburettor.  
a. both No. 1 and No. 2 are true.\*  
b. only No. 2 is true.  
c. neither No. 1 nor No. 2 is true.
70. (1) Is fuel pressure relief valve is required on an aircraft positive displacement fuel pump.  
(2) A fuel pressure relief valve is required on an aircraft centrifugal fuel boost pump.  
Regarding the above statements.  
a. both No. 1 and No. 2 are true.  
b. only No. 2 is true.  
c. only No. is true.\*
71. The primary purpose of a fuel tank sump is to provide  
a  
a. place where water and dirt accumulations in the tank can collect and be drained.\*  
b. positive system on maintaining the design minimum fuel supply for safe operation.  
c. reserve supply of fuel to enable the aircraft to land safely in the event of fuel exhaustion.
72. Why are integral fuel tanks used in many large aircraft?  
a. To facilitate servicing.  
b. To reduce weight.\*  
c. To reduce fire hazards.
73. If an aircraft is fueled from a truck or storage tank which is known to be uncontaminated with dirt or water, periodic checks of the aircraft's fuel tank sumps and system strainers  
a. are still necessary due to the possibility of contamination from other sources.\*  
b. can be eliminated except for the strainer check before the first flight of the day and the fuel tank sump check during 100-hour or annual inspections.  
c. can be sharply reduced since contamination from other sources is relatively unlikely and of little consequence in modern aircraft fuel systems.
74. Aircraft defueling should be accomplished  
a. with the aircraft's communication equipment on and in contact with the tower in case of fire.  
b. in a hangar where activities can be controlled.  
c. in the open air for good ventilation.\*
75. Integral fuel tanks are  
a. usually constructed of nonmetallic material.  
b. readily removed from the aircraft.  
c. formed by the aircraft structure.\*
76. What precautions must be observed if a gravity feed fuel system is permitted to supply fuel to an engine from more than one tank at a time?  
a. Each tank must have a valve in its outlet that automatically shuts off the line when the tank is empty.  
b. The fuel outlet ports of each tank must have the same cross sectional area.  
c. The tank airspaces must be interconnected.\*
77. The purpose of the baffle plate in a fuel tank is to  
a. resist fuel surging within the fuel tank.\*  
b. provide internal structural integrity.  
c. provide an expansion space for the fuel.
78. What minimum required markings must be placed on or near each appropriate fuel filler cover on utility category aircraft?  
a. The word "Avgas" and the minimum fuel grade, and the total fuel tank capacity.  
b. The word "Avgas" and the minimum fuel grade, and the total fuel tank capacity.  
c. The word "Avgas" and the minimum fuel grade.\*
79. What is one disadvantage of using aromatic aviation fuels?  
a. Results in low fuel volatility.  
b. A fuel intercooler is required.  
c. Deteriorates rubber parts.\*
80. Fuel boost pumps are operated  
a. automatically from fuel pressure.  
b. primarily for fuel transfer.  
c. to provide a positive flow of fuel to the engine.\*
81. Flapper valves are used in fuel tanks to  
a. act as check valves.\*  
b. reduce pressure.  
c. prevent a negative pressure.
82. Why are centrifugal type boost pumps used in fuel systems of aircraft operating at high altitude?  
a. To permit cooling air to circulate around the motor.  
b. To supply fuel under pressure to engine driven pumps.\*  
c. Because they are positive displacement pumps.
83. Why is it necessary to vent all aircraft fuel tanks?  
a. To ensure a positive head pressure for a submerged boost pump.  
b. To exhaust fuel vapors.  
c. To limit pressure differential between the tank and atmosphere.\*



84. According to Part 23, what minimum required markings must be placed at or near each appropriate fuel filler cover for reciprocating engine-powered airplanes?
- The word "Avgas" and the minimum fuel grade.\*
  - The word "Fuel" and usable fuel capacity.
  - The word "Avgas" and the total fuel capacity.
85. The location of leaks and defects within the internal portions of the fuel system can usually be determined by
- observing the pressure gauge and operating the selector valves.\*
  - visual inspection for evidence of wet spots and stains, and feeling for unusually warm components.
  - performing a fuel flow check.
86. What type of fuel booster pump requires a pressure relief valve?
- Centrifugal.
  - Sliding vane.\*
  - Concentric.
87. To prevent vapor lock in fuel lines at high altitude, some aircraft are equipped with
- vapor separators.
  - booster pump.\*
  - direct injection type carburetor
88. When inspecting a fuel system, you should check all valves located downstream of boost pumps with the pumps
- operating.\*
  - dormant.
  - at idle.
89. The type of fuel boost pump that separates air and vapor from the fuel before it enters the line to the carburetor is the
- gear type pump.
  - centrifugal type pump.\*
  - sliding vane type pump.
90. (1) On a large aircraft pressure refueling system, a pressure refueling receptacle and control panel will permit one person to fuel or defuel any or all fuel tanks of an aircraft.  
(2) Because of the fuel tank area, there are more advantages to a pressure fueling system in light aircraft.  
Regarding the above statements,
- only No. 1 is true.\*
  - both No. 1 and No. 2 are true.
  - only No. 2 is true.
91. When routing a fuel line between two rigidly mounted fittings the line should
- have a flexible line added between two metal lines to allow for ease of installation.
  - have at least one bend between such fittings.\*
  - be a straight length of tubing and clamped to the aircraft structure.
92. (1) If aviation gasoline vaporizes too readily, fuel lines may become filled with vapor and cause increased fuel flow.  
(2) A measure of a gasoline's tendency to vapor lock is obtained from the Reid vapor pressure test.  
Regarding the above statements,
- only No. 2 is true.\*
  - both No. 1 and No. 2 are true.
  - neither No. 1 nor No. 2 is true.
93. Microbial growth is produced by various forms of micro organisms that live and multiply in the water interfaces of jet fuels. Which of the following could result if microbial growth exists in a jet fuel tank and is not corrected?
- Interference with fuel flow.
  - Interference with fuel quantity indicators.
  - Engine seizure.
  - Electrolytic corrosive action in a metal tank.
  - Lower grade rating of the fuel.
  - Electrolytic corrosive action in a rubber tank.
- 2, 3, 5.
  - 1, 5, 6.
  - 1, 2, 4.\*
94. The vapor pressure of aviation gasoline is
- lower than the vapor pressure of automotive gasoline.\*
  - approximately 20 PSI at 100 °F.
  - higher than the vapor pressure of automotive gasoline.
95. What can be done to eliminate or minimize the microbial growth problem in an aircraft jet fuel tank?
- Use anti icing and antibacterial additives.\*s
  - Keep the fuel tank topped off.
  - Add CO<sub>2</sub> as a purgative.
96. What is the maximum vapor pressure allowable for an aircraft fuel?
- 7 PSI.\*
  - 3 PSI.
  - 5 PSI.
97. If a bladder type fuel tank is to be left empty for an extended period of time, the inside of the tank should be coated with a film of
- ethylene glycol.
  - engine oil.\*
  - linseed oil.
98. How may the antiknock characteristics of a fuel be improved?
- By adding a knock enhancer.
  - By adding a knock inhibitor.\*
  - By adding a fungicide agent.

#### QUESTIONS AND ANSWERS

- Why do some aircraft have fuel jettison systems?

Answer– To allow the crew to reduce the weight of the aircraft down to or below the maximum allowable landing weight.

2. Is there any reason why a fuel jettison system might be required on a small aircraft?

Answer– Yes, if the maximum takeoff weight exceeds the maximum allowable landing weight, a jettison system would be required.

3. What are some other names for a single-point fuelling system?

Answer– An underwing or pressure fuelling system.

4. Why do multi-engine airplanes have fuel crossfeed systems?

Answer– To allow any engine to draw fuel from any tank.

5. The fuel selector valve for a multi-engine aircraft must have at least three positions. What are they?

Answer– ON, OFF, and Crossfeed.

6. Why do some fuel tanks have internal baffles?

Answer– To resist fuel surging or sloshing caused by changes in the attitude of the aircraft.

7. What are the two types of fuel cells?

Answer– Integral or wet wing fuel cells, and bladder-type fuel cells.

8. What does the term “wet wing” mean?

Answer– It means that sealed portions of the aircraft wing structure form the fuel tank(s).

9. How is the weight of the fuel supported when bladder-type fuel cells are used?

Answer– The bladder is supported by the aircraft structure which contains it.

10. Why do turbine-engine aircraft have fuel temperature indicating systems?

Answer– To allow the crew to determine if the fuel is cold enough to produce a danger of the formation of ice crystals.

11. Name four types of fuel quantity gauging systems currently in use.

Answer– Sight gauges, mechanical, electric, and electronic gauges.

12. Why are electronic (capacitance-type) fuel quantity indicating systems more accurate than other types?

Answer– They measure the mass of the fuel instead of the volume.

13. What are drip gauges and sight gauges?

Answer– Underwing, bayonet-type fuel gauges.

14. What is the purpose of an in-transit light associated with an electrically operated fuel tank shutoff valve?

Answer– To provide an indication that the valve is in motion between one position and another.

15. For what reason is a fuel jettison system usually divided into two separate, independent systems, one for each wing?

Answer– To help maintain lateral stability by jettisoning fuel from a heavy wing if necessary.

16. What procedures should be followed regarding gaskets and seals when replacing fuel system components?

Answer– All old gaskets and seals should be replaced with new ones.

17. Is it possible for a fuel system to develop a leak that has no visible evidence such as a stain or spot, and if so, how?

Answer– An internal component such as a valve could develop a leak.

18. How is a fuel tank checked for leaks following a patch or welded repair?

Answer– The tank is slightly pressurized with air and the repaired area is leak-checked with a soap and water solution.

19. Name some advantages of a single-point fuelling system.

Answer– It reduces fuelling time, reduces chances for contamination and fire, and eliminates damage to the aircraft skin.

20. Why should you wait for a period of time after fuelling an aircraft before checking the fuel sumps?

Answer– To allow time for water and contaminants to settle to the drain point.

## FIRE PROTECTION SYSTEMS

1. Cabin upholstery materials in current standard category airplanes must
  - a. meet the requirements prescribed in Part 43.
  - b. be at least flame resistant.\*
  - c. be fireproof.

2. In What area of an aircraft would you find a carbon monoxide detector?
  - a. Engine and/or nacelle.
  - b. Surface combustion heater compartment.
  - c. Cockpit and/or cabin.\*
3. What occurs when a visual smoke detector is activated?
  - a. A lamp with in the indicator illuminates automatically.\*
  - b. The test lamp illuminates and an alarm is provided automatically.
  - c. A warning bell within the indicator alarms automatically.
4. The types of fire extinguishing agents for aircraft interior fires are
  - a. water, carbon dioxide, dry chemical, and halogenated hydrocarbons.\*
  - b. water, dry chemical, methyl bromide, and chlorobromomethane.
  - c. water, carbon tetrachloride, carbon dioxide, and dry chemical.
5. When air samples contain carbon monoxide, portable carbon monoxide detectors containing yellow silica gel will turn which color?
  - a. Blue.
  - b. Green.\*
  - c. Red.
6. Smoke detection instruments are classified by their method of
  - a. detection.\*
  - b. construction.
  - c. maintenance.
7. Smoke detectors which use a measurement of light transmissibility in the air are called
  - a. visual devices.
  - b. electromechanical devices.
  - c. photoelectrical devices.\*
8. A contaminated carbon monoxide portable test unit would be returned to service by
  - a. installing a new indicating element.\*
  - b. evacuating the indicating element with CO<sub>2</sub>.
  - c. heating the indicating element to 300 °F to reactivate the chemical.
9. Which fire detection system measures temperature rise compared to a reference temperature?
  - a. Lindberg continuous element.
  - b. Fenwal continuous loop.
  - c. Thermocouple.\*
10. A carbon dioxide (CO<sub>2</sub>) hand held fire extinguisher may be used on an electrical fire if the
  - a. horn is nonmagnetic.
  - b. horn is nonmetallic.\*
  - c. handle is insulated.
11. The proper fire extinguishing agent to use on an aircraft brake fire is
  - a. dry powder chemical \*.
  - b. water.
  - c. carbon dioxide.
12. Smoke in the cargo and/or baggage compartment of an aircraft is commonly detected by which instrument?
  - a. Chemical reactor.
  - b. Photoelectric cell.
  - c. Sniffer.
13. Light refraction smoke detectors
  - a. sense light reflected from smoke particles passing through a chamber.
  - b. use radiation induced ionization to detect the presence of smoke.
  - c. measure a reduction in the amount of visible or infrared light in the surrounding area.
14. Why does the Fenwal fire detection system use spot detectors wired parallel between two separate circuits?
  - a. A short may exist in either circuit without causing a false fire warning.
  - b. A control unit is used to isolate the bad system in case of malfunction.
  - c. This installation is equal to two systems: a main system and a reserve system.
15. A fire extinguisher container can be checked to determine its charge by
  - a. attaching a remote pressure gauge.
  - b. weighing the container and its contents.
  - c. a hydrostatic test.
16. What is the color code for fire extinguisher lines?
  - a. Brown.
  - b. Yellow.
  - c. Red and green.
17. The most common cause of false fire warning in continuous loop fire detection systems is
  - a. dents, kinks, or crushed sensor sections.
  - b. moisture.
  - c. improper routing or clamping of loops.
18. A thermocouple in a fire detection system causes the warning system to operate because
  - a. heat decreases its electrical resistance.
  - b. it expands when heated and forms a ground for the warning system.
  - c. it generates a small current when heated.
19. The thermocouple fire warning system is activated by a
  - a. certain temperature.
  - b. core resistance drop.
  - c. rate of temperature rise.

- 20. When used in fire detection system having a single indicator light, thermal switches are wired in
  - a. series with each other and parallel with the light.
  - b. parallel with each other and in series with the light.
  - c. series with each other and the light.
- 21. Built-in aircraft fire-extinguishing systems are ordinarily charged with
  - a. sodium bicarbonate and nitrogen.
  - b. carbon dioxide and nitrogen.
  - c. halogenated hydrocarbons and nitrogen
- 22. In reference to aircraft fire extinguishing systems,
  - (1) during removal or installation, the terminals of discharge cartridges should be grounded or shorted.
  - (2) before connecting cartridge terminals to the electrical system, the system should be checked with a voltmeter to see that no voltage exists at the terminal connections.

Regarding the above statements,

  - a. neither No. 1 nor No. 2 is true.
  - b. both No. 1 and No. 2 true.
  - c. only No. 2 is true.
- 23. What method is used to detect the thermal discharge of a built in fire extinguisher system?
  - a. A discoloring of the yellow plastic disk in the thermal discharge line.
  - b. A rupture of the red plastic disk in the thermal discharge line.
  - c. The thermal plug missing from the side of the bottle.
- 24. The thermal switches of a bimetallic thermal switch type fire detection system are heat sensitive units that complete circuits at a certain temperature. They are connected in
  - a. series with each other, but in parallel with the indicator lights.
  - b. parallel with each other, but in series with the indicator lights.
  - c. parallel with each other, and in parallel with the indicator lights.
- 25. (Refer to Table 9.2) Using the chart, determine the temperature range for a fire extinguishing agent storage container with a pressure of 330 PSIG. (Consider 330 PSIG for both minimum and maximum pressure.)
  - a. 47 to 71 °F.
  - b. 47 to 73 °F.
  - c. 45 to 73 °F.
- 26. (Refer to Table 9.2) Determine what pressure is acceptable for a fire extinguisher when the surrounding area temperature is 33 °F. (Rounded to the nearest whole number.)
  - a. 215 to 302 PSIG
  - b. 214 to 301 PSIG
  - c. 215 to 301 PSIG
- 27. On a periodic check of fire extinguisher containers, the pressure was not between minimum and maximum limits. What procedure should be followed?
  - a. Release pressure if above limits.
  - b. Replace the extinguisher container.
  - c. Increase pressure if below limits.

<b>CONTAINER PRESSURE VERSUS TEMPERATURE</b>		
<b>Temperature °F</b>	<b>Container Pressure (PSIG)</b>	
	<b>Minimum</b>	<b>Maximum</b>
-40	60	145
-30	83	165
-20	105	188
-10	125	210
0	145	230
10	167	252
20	188	275
30	209	295
40	230	317
50	255	342
60	284	370
70	319	405
80	356	443
90	395	483
100	438	523

Table 9.2. Fire Extinguisher Chart

28. In some fire extinguishing systems, evidence that the system has been intentionally discharged is indicated by the absence of a
- red disk on the side of the fuselage.
  - yellow disk on the side of the fuselage.
  - green disk on the side of the fuselage.
29. If a fire extinguisher cartridge is removed from a discharge valve for any reason, it
- cannot be used again.
  - must be pressure checked.
  - is recommended that the cartridge be used only on the original discharge valve assembly
30. Which of the following are fire precautions which must be observed when working on an oxygen system?
- Display "No Smoking" placards.
  - Provide adequate fire fighting equipment.
  - Keep all tools and oxygen servicing equipment free from oil or grease.
  - Avoid checking aircraft radio or electrical systems.
- 1, 3, and 4.
  - 1, 2, 3, and 4.
31. Which fire extinguishing agent is considered to be the least toxic?
- Bromochloromethane (Halon 1011.)
  - Carbon dioxide.
  - Bromotrifluoromethane (Halon 13010).
32. Maintenance of fire detection systems includes the
- removal of excessive loop or element material.
  - repair of damaged sensing elements.
  - replacement of damaged sensing elements.
33. A squib, as used in a fire protection system, is a
- temperature sensing device.
  - probe used for installing frangible disks in extinguisher bottles.
  - device for causing the fire extinguishing agent to be released.
4. In what way is a thermocouple fire warning system different from a thermal switch system?
- Answer– Thermocouple systems are sensitive to the rate of temperature change, whereas thermal switch systems respond to a specific temperature value.
5. Briefly describe the components of a Kidde continuous loop fire detection system.
- Answer– A Kidde system has an inconel tube containing one or more wires embedded in a ceramic core whose resistance changes with temperature.
6. Briefly describe the components and operation of a Lindberg fire detection system.
- Answer– A stainless steel tube contains an inert gas and a discrete material that absorbs some of the gas. When the tube heats up, some gas is released, raising the pressure in the tube, which activates a pressure switch.
7. Describe the process or mechanism by which a photoelectric smoke detector generates a warning of a possible fire.
- Answer– Smoke particles refract light in the detector unit causing the photoelectric cell to conduct electricity and trigger the alarm.
8. How can the operation of a photoelectric smoke detector be tested?
- Answer– By actuating a test switch.
9. Name two types of smoke detection systems used in aircraft.
- Answer– Light refraction (photoelectric) types and ionization types.

### QUESTIONS AND ANSWERS

1. Briefly describe the components of a thermal switch fire detection system.
- Answer– Temperature sensitive switches that complete a circuit at a specific temperature and trigger a warning.
2. Are thermal switches wired in series or in parallel with each other?
- Answer– Parallel
3. How are the detector units in a double-loop Fenwal system wired?
- Answer– In parallel between two complete loops of wiring.
10. What are the usual locations where a carbon monoxide detector would be installed?
- Answer– In an aircraft cockpit or cabin.
11. How does a carbon monoxide detector indicate the presence of this deadly gas?
- Answer– The tan spot on the detector turns gray or black.
12. What are the possible effects of kinks and sharp bends in the sensing element (s) of a fire warning system?
- Answer– False fire warnings caused by short circuits.

13. How is a Freon container checked for proper pressure?  
Answer— A chart must be used to determine the maximum and minimum gauge pressure readings based on the ambient temperature.
14. Name the two basic types of fire extinguishing systems.  
Answer— The conventional system and the high-rate discharge system.
15. Name the extinguishing agent most commonly used by conventional fire extinguishing systems.  
Answer— Carbon dioxide (CO<sub>2</sub>)
16. Name the extinguishing agent most commonly used by high-rate discharge fire extinguishing systems.  
Answer— Halon (Halogenated hydrocarbon type agents), also known as Freon.
17. How are Freon bottles protected from excessively high temperatures and how can you tell that this has occurred?  
Answer— A thermal fuse (or blowout disk) will release the agent if the bottle temperature exceeds a certain limit. This blows out a red indicator disk.
18. What condition is indicated if the yellow disk is missing in a fire extinguishing system?  
Answer— The system has been discharged normally.
19. Describe the mechanism by which a Freon bottle is discharged.  
Answer— An electrical signal fires an explosive squib, which ruptures a fragile disk.
20. How is the service life of a discharge cartridge calculated?  
Answer— From the date stamped on the cartridge by the manufacturer.
2. When overhauling electrical equipment, all necessary information should be obtained from  
a. illustrated parts manual for the aircraft.  
b. maintenance instructions published by the aircraft and/or equipment manufacturer.  
c. the aircraft maintenance manual.
3. Which statement is correct regarding an aircraft that is found to be unairworthy after an annual inspection, due to an item requiring a major repair (assuming approved data is used to accomplish the repair)?  
a. An appropriately rated mechanic may accomplish the repair, and an IA may approve the aircraft for return to service.  
b. Only the person who performed the annual inspection may approve the aircraft for return to services, after the major repair.  
c. An appropriately rated mechanic or repair station may repair the defect and approve the aircraft for return to service.
4. Radio equipment installations made in accordance with Supplemental Type Certificate data require approval for return to service  
a. by an airframe and powerplant mechanic.  
b. by the holder of an inspection authorization.  
c. by a field approval from the FAA
5. An aircraft that is required by Section 91.409, to have a 100-hour inspection may be flown beyond the inspection requirement.  
a. if necessary to reach a place at which the inspection can be accomplished, but not to exceed 10 flight hours.  
b. if necessary to reach a place at which the inspection can be accomplished, but a special flight permit is necessary.  
c. if necessary to reach a place at which the inspection can be accomplished, but not to exceed 15 flight hours.
6. Where would you find the recommended statement for recording the approval or disapproval for return to service of an aircraft after a 100-hour or annual inspection?  
a. 14 CFR Part 65.  
b. 14 CFR Part 43.  
c. 14 CFR Part 91.

## AIRCRAFT AIRWORTHINESS INSPECTION

1. Which statement about Airworthiness Directives (AD's) is true?  
a. Compliance with an AD is not mandatory unless the aircraft affected is for hire.  
b. AD's are information alert bulletins issued by the airframe, powerplant, or component manufacturer.  
c. Compliance with an applicable AD is mandatory and must be recorded in the maintenance records.
7. The maximum time a 100-hour inspection may be extended is  
a. 10 hours.  
b. 10 hours with a special flight permit.  
c. 12 hours with a special flight permit.

8. Which statement is correct when an aircraft has not been approved for return to service after an annual inspection because of several items requiring minor repair?
- Only the person who performed the annual inspection may approve the aircraft for return to service.
  - An appropriately rated mechanic may repair the defects, but an IA must approve the aircraft for return to service.
  - An appropriately rated mechanic may repair the defects and approve the aircraft for return to service.
9. An aircraft that is due an annual inspection may be flown
- for the purpose of performing maintenance.
  - for a period of time not to exceed 10 hours.
  - if a special permit has been issued for the aircraft.
10. For an individual (not a repair station) to conduct a complete 100-hour inspection on an aircraft and approve it for return to service requires a mechanic certificate with an
- airframe rating only.
  - airframe and powerplant ratings with an inspection authorization.
  - airframe and powerplant ratings.
11. Where would you find the operating conditions that make a 100-hour inspection mandatory?
- 14 CFR part 91.
  - 14 CFR part 43.
  - AC 43.13-2A.
12. Large airplanes and turbine-powered multiengine airplanes operated under Federal Aviation Regulation Part 91, General Operating and Flight Rules, must be inspected
- in accordance with a continuous airworthiness maintenance program (camp program) authorized under Federal Aviation Regulation Part 91, Subpart E.
  - In accordance with the progressive inspection requirements of Federal Aviation Regulation Section 91.409(d).
  - in accordance with an inspection program authorized under Federal Aviation Regulation Part 91, Subpart E.
3. Under what conditions may a mechanic perform an annual inspection and return the aircraft to service?
- Answer– The mechanic must hold an Inspection Authorization.
4. What is the time frame within which an annual inspection must be performed if such an inspection is required?
- Answer– Within the preceding 12 calendar months.
5. Under what conditions may any checklist be used as a guide for a 100-hour inspection?
- Answer– the checklist must meet the minimum standards specified in FAR Part 43, Appendix D.
6. May an aircraft that is overdue for an annual inspection be flown to a place where the inspection can be performed?
- Answer– yes, provided a ferry (special flight) permit is obtained.
7. In order for an individual person to conduct a 100-hour inspection and approve the return to service, that person must have what type of certificates (s)?
- Answer– A mechanic's certificate with both the Airframe and Powerplant ratings.
8. An aircraft is required by FAR 91.409 to have a 100-hour inspection. Is it legal to fly that airplane beyond the inspection requirement, and if so, for how long?
- Answer– Yes, the aircraft may be operated for up to 10 hours, if required, to reach a place where the inspection can be accomplished.
9. An airplane is flown 4 hours over the 100-hour inspection limit to reach your maintenance facility. How do you account for those 4 hours?
- Answer– The 4 hours are included in the next 100 hours time-in-service period.
10. What types of operations require that aircraft operating under Part 91 must undergo 100-hour inspections?
- Answer– Aircraft operated for compensation or hire, or used for flight instruction when provided by the flight instructor.
11. An aircraft under a progressive inspection program is operated for compensation or hire. Does it need a 100-hour inspection?
- Answer– No, progressive inspections replace 100-hour inspections.

### QUESTIONS AND ANSWERS

1. Where do you find the regulation that specifies the operating conditions that make 100-hour inspections mandatory?

Answer– FAR Part 91

2. A certificated Airframe and Powerplant mechanic may sign off and approve the return to service following what type of inspection?

Answer– A 100-hour inspection.

12. Who is authorized to supervise a progressive inspection?

Answer– Certificated A & P mechanics who hold an Inspection Authorization, certified repair stations, or the aircraft manufacturer.

13. When a progressive inspection program is discontinued, at what time is the next 100-hour inspection due?

Answer– 100 hours after the last complete inspection of the progressive program.

14. An owner desires to use a progressive inspection program. To show does the owner apply for authorization?

Answer– To the FAA Flight Standards District Office having jurisdiction over the area where the owner is located.

15. Is an engine run-up required as part of a 100-hour inspection on a turbine-powered aircraft?

Answer– Yes

16. Where would you locate the required items that must be recorded in the aircraft maintenance records following completion of a 100-hour inspection?

Answer– FAR Part 43

17. Where might you locate a sample of the recommended statement for recording the approval for return to service of an aircraft following completion of an annual or 100-hour inspection?

Answer– FAR Part 43

18. Where would you look to find approved information for work on an aircraft electrical system?

Answer– In the manufacturer's maintenance manual or other instructions for continued airworthiness.

19. What are the limitations placed on mechanics with regard to propellers?

Answer– Mechanics may not perform major repairs to, or alterations of, propellers

20. After equipment is installed in accordance with an STC, who must approve the return to service?

Answer– An A and P mechanic who holds an Inspection Authorization.





# CHAPTER - 10

## IMPORTANT QUESTIONS FROM PAPER-II POINT OF VIEW

1. The working voltage of a capacitor in an AC circuit should be
  - a. At least 50 percent greater than the highest applied voltage \*
  - b. Equal to the highest applied voltage
  - c. At least 20 percent greater than the highest applied voltage
2. The term that describes the combined resistive forces in an AC circuit is
  - a. Impedance \*
  - b. Reactance
  - c. Resistance
3. The basis for transformer operation in the use of alternating current is mutual
  - a. Reactance
  - b. Capacitance
  - c. Inductance \*
4. The opposition offered by a coil to the flow of alternating current is called (disregard resistance)
  - a. Impedance
  - b. Inductive reactance \*
  - c. Reluctance
5. An increase in which of the following factors will cause an increase in the inductive reactance of a circuit
  - a. Resistance and voltage
  - b. Inductance and frequency \*
  - c. Resistance and capacitive reactance
6. In an AC circuit, the effective voltage is
  - a. Less than the maximum instantaneous voltage \*
  - b. Greater than the maximum instantaneous voltage
  - c. Equal to the maximum instantaneous voltage
7. The amount of electricity a capacitor can store is directly proportional to the
  - a. Plate area and is not affected by the distance between the plates
  - b. Distance between the plates and inversely proportional to the plate area
  - c. Plate area and inversely proportional to the distance between the plates \*
8. Unless otherwise specified, any values given for current or voltage in an AC circuit are assumed to be
  - a. Effective values \*
  - b. Instantaneous values
  - c. Maximum values
9. When inductors are connected in series in a circuit, the total inductance is (where the magnetic fields of each inductor do not affect the others)
 

Note :  $L_T = L_1 + L_2 + L_3$

  - a. Equal to the inductance of the highest rated inductor
  - b. Less than the inductance of the lowest rated inductor
  - c. Equal to the sum of the individual inductances \*
10. Which requires the most electrical power during operation
 

Note : 1 horsepower = 746 watts

  - a. A 12 volt motor requiring 8 amperes
  - b. Four 30 watt lamps in a 12 volt parallel circuit \*
  - c. Two lights requiring 3 amperes each in a 24 volt parallel system
11. How many amperes will a 28 volt generator be required to supply to a circuit containing five lamps in parallel, three of which have a resistance of 6 ohms each and two of which have a resistance of 5 ohms each
  - a. 1.11 amperes \*
  - b. 1 ampere
  - c. 25.23 amperes
12. The potential difference between two conductors which are insulated from each other is measured in
  - a. Coulombs
  - b. Amperes
  - c. Volts \*
13. A 24 volt source is required to furnish 48 watts to a parallel circuit consisting of four resistors of equal value. What is the voltage drop across each resistor
  - a. 6 volts
  - b. 12 volts
  - c. 24 volts \*
14. When calculating power in a reactive or inductive AC circuit, the true power is
  - a. Less than the apparent power in a reactive circuit and more than the apparent power in an inductive circuit
  - b. Less than the apparent power \*
  - c. More than the apparent power
15. The correct way to connect a test voltmeter in a circuit is
  - a. In series with a unit
  - b. In parallel with a unit \*
  - c. Between the source voltage and the load
16. Which term means .001 ampere
  - a. Microamperes
  - b. Milliampere \*
  - c. Kiloamperes

17. A cabin entry light of 10 watts and a dome light of 20 watts are connected in parallel to a 30 volt source. If the voltage across the 10 watt light is measured, it will be
- Equal to the voltage across the 20 watt light \*
  - Half the voltage across the 20 watt light
  - One third of the input voltage
18. A 14 ohm resistor is to be installed in a series circuit carrying .05 ampere. How much power will the resistor be required to dissipate
- At least .70 milliwatt \*
  - At least 35 milliwatts
  - Less than .035 watt
19. .002KV equals
- .2 volt \*
  - 2.0 volts
  - 20 volts
20. A 24 volt source is required to furnish 48 watts to a parallel circuit consisting of two resistors of equal value. What is the value of each resistor ?  
Note :  $R_t = E^2 / P$
- 6 ohms
  - 12 ohms
  - 24 ohms \*
21. Which requires the most electrical power ?
- A 1/5 horsepower, 24 volt motor which is 75 percent efficient
  - A 24 volt anticollision light circuit consisting of two light assemblies which require 3 amperes each during operation \*
  - Four 30 watt lamps arranged in a 12 volt parallel circuit
22. What unit is used to express electrical power
- Watt \*
  - Ampere
  - Volt
23. What is the operating resistance of a 30 watt light bulb designed for a 28 volt system
- 1.07 ohms
  - 0.93 ohms
  - 26 ohms
  - 25.2 ohms \*
24. Which statement is correct when made in reference to a parallel circuit ?
- The current is equal in all portions of the circuit
  - The current in amperes can be found by dividing the EMF in volts by the sum of the resistors in ohms
  - The total current is equal to the sum of the currents through the individual branches of the circuit \*
25. Diodes are used in electrical power supply circuits primarily as
- Switches
  - Rectifiers \*
  - Relays
26. Transfer of electrical energy from one conductor to another without the aid of electrical connections
- Will cause excessive arcing and heat, and as a result is impractical
  - Is called air gap transfer
  - Is called induction \*
27. If three resistors of 3 ohms, 5 ohms, and 22 ohms are connected in series in a 28 volt circuit, how much current will flow through the 3 ohm resistor ?
- 9.3 amperes
  - 0.93 ampere \*
  - 1.05 amperes
28. A circuit has an applied voltage of 30 volts and a load consisting of a 10 ohm resistor in series with a 20 ohm resistor, What is the voltage drop across the 10 ohm resistor
- 10 volts \*
  - 30 volts
  - 20 volts
29. Which is correct is reference to electrical resistance
- If one of three bulbs in a parallel lighting circuit is removed, the total resistance of the circuit will become greater. \*
  - An electrical device that has a high resistance will use more power than one with a low resistance with the same applied voltage
  - Two electrical devices will have the same combined resistance if they are connected in series as they will have if connected in parallel
30. What happens to the current in a voltage step up transformer with a ratio of 1 to 4
- The current is stepped up by a 1 to 4 ratio
  - The current does not change
  - The current is stepped down by a 1 to 4 ratio \*
31. Which of these will cause the resistance of a conductor to decrease
- Decrease the length or the cross sectional area
  - Increase the length or increase the cross sectional area \*
  - Increase the length decrease the cross sectional area
32. Through which material will magnetic lines of force pass the most readily
- Aluminum
  - Copper
  - Iron \*
33. A 48 volt source is required to furnish 192 watts to a parallel circuit consisting of three resistors of equal value. What is the value of each resistor
- 36 ohms \*
  - 12 ohms
  - 4 ohms
34. Which is correct concerning a parallel circuit
- Total resistance will decrease when one of the resistances is removed
  - Total voltage drop is the same as the total resistance
  - Total resistance will be smaller than the smallest resistor \*

35. The voltage drop in a circuit of known resistance is dependent on
- Only the resistance of the conductor, and does not change with a change in either voltage or amperage\*
  - The amperage of the circuit
  - The voltage of the circuit
36. A thermal switch, as used in an electric motor, is designed to
- Open the circuit in order to allow cooling of the motor \*
  - Close the integral fan circuit to allow cooling of the motor
  - Reroute the circuit to ground
37. When referring to an electrical circuit diagram, what point is considered to be at zero voltage
- The circuit breaker
  - The switch
  - The ground reference \*
38. In a P-N-P transistor application, the solid state device is turned on when the
- Base is positive with respect to the emitter \*
  - Base is negative with respect to the emitter
  - Emitter is negative with respect to the base
39. In an N-P-N transistor application, the solid state device is turned on when the
- Base is negative with respect to the emitter \*
  - Base is positive with respect to the emitter
  - Emitter is positive with respect to the base
40. Typical application for zener diodes is as
- Full-wave rectifiers
  - Half-wave rectifiers
  - Voltage regulators \*
41. Forward biasing of a solid state device will cause the device to
- Conduct \*
  - Conduct via zener breakdown
  - Turn off
42. A lead acid battery with 12 cells connected in series (no load voltage = 2.1 volts per cell) furnishes 10 amperes to a load of 2 ohms resistance. The internal resistance of the battery in this instance is
- 5.0 ohms
  - 0.52 ohm \*
  - 2.52 ohms
43. If electrolyte from a lead acid battery is spilled in the battery compartment, which procedure should be followed
- Apply sodium bicarbonate solution to the affected area followed by a water rinse
  - Apply boric acid solution to the affected area followed by a water rinse
  - Rinse the affected area thoroughly with clean water\*
44. Which statement regarding the hydrometer reading of a lead acid storage battery electrolyte is true
- The hydrometer reading will give a true indication of the capacity of the battery regardless of the electrolyte temperature
  - A specific gravity correction should be added to the hydrometer
  - The hydrometer reading does not require a temperature correction if the electrolyte temperature is 80 °F \*
45. A fully charged lead acid battery will not freeze until extremely low temperatures are reached because
- Most of the acid is in the solution \*
  - Increased internal resistance generates sufficient heat to prevent freezing
  - The acid is in the plates, thereby increasing the specific gravity of the solution
46. What determines the amount of current which will flow through a battery while it is being charged by a constant voltage source
- The ampere hour capacity of the battery
  - The total plate area of the battery
  - The state of charge of the battery \*
47. Which of the following statements is /are generally true regarding the charging of several aircraft batteries together
- Batteries of different voltages (but similar capacities) can be connected in series with each other across the charger, and charged using the constant current method
  - Batteries of different ampere hour capacity and same voltage can be using the constant voltage method
  - Batteries of the same voltage and same ampere hour capacity must be using the constant current method
    - 1 and 2
    - 2 and 3
    - 3 \*
48. The method used to rapidly charge a nickel cadmium battery utilizes
- Constant current and constant voltage
  - Constant current and varying voltage
  - Constant voltage and varying current \*
49. The purpose of providing a space underneath the plates in a lead acid battery's cell container is to
- Allow for convection flow of the electrolyte in order to provide for cooling of the plates
  - Prevent sediment buildup from contacting the plates and causing a short circuit \*
  - Ensure that the electrolyte quantity ratio to the number of plates and plate area is adequate
50. Which condition is an indication of improperly torqued cell link connections of a nickel cadmium battery
- Heat or burn marks on the hardware \*
  - Light spewing at the cell caps
  - Toxic and corrosive deposits of potassium carbonate crystals

51. The presence of any small amount of potassium carbonate deposits on the top of nickel cadmium battery cells in service is an indication of  
 a. Excessive gassing \* b. Normal operation  
 c. Plate sulfation
52. The servicing and charging of nickel cadmium and lead acid batteries together in the same service area is likely to result in  
 a. Contamination of both types of batteries \*  
 b. Increased explosion and/or fire hazard  
 c. Normal battery service life
53. The electrolyte of a nickel cadmium battery is the lowest when the battery is  
 a. Being charged  
 b. In a discharged condition \*  
 c. Under a heavy load condition
54. The end of charge voltage of a 19 cell nickel cadmium battery, measured while still on charge  
 a. Depends upon its temperature and the method used for charging  
 b. Must be 1.4 volts per cell \*  
 c. Must be 1.2 to 1.3 volts per cell
55. Nickel cadmium batteries which are stored for a long period of time will show a low liquid level because  
 a. Electrolyte evaporates through the vents  
 b. Of current leakage from individual cells.  
 c. Electrolyte becomes absorbed into the plates \*
56. How can the state of charge of a nickel cadmium battery be determined  
 a. By measuring the specific gravity of the electrolyte  
 b. By the level of the electrolyte  
 c. By a measured discharge \*
57. What may result if water is added to a nickel cadmium battery when it is not fully charged  
 a. Excessive electrolyte dilution  
 b. No adverse effects since water may be added anytime  
 c. Excessive spewing is likely to occur during the charging cycle \*
58. In nickel cadmium batteries, a rise in cell temperature  
 a. Increases cell voltage  
 b. Causes a decrease in internal resistance \*  
 c. Causes an increase in internal resistance
59. When a charging current is applied to a nickel cadmium battery, the cells emit gas only  
 a. If they are defective  
 b. Toward the end of the charging cycle \*  
 c. When the electrolyte level is low
60. What type of line is normally used in a mechanical drawing or blueprint to represent an edge or object not visible to the viewer  
 a. Alternate short and long light dashes  
 b. Medium weight dashed line \*  
 c. Medium solid line
61. i. A detail drawing is a description of a single part  
 ii. An assembly drawing is a description of an object made up of two or more parts  
 Regarding the above statements  
 a. Both No. 1 and No. 2 are true \*  
 b. Only No. 1 is true  
 c. Neither No. 1 nor No. 2 is true
62. A specific measured distance from the datum or some other point identified by the manufacturer, to a point in or on the aircraft is called a  
 a. Reference number b. Station number \*  
 c. Zone number
63. Which statement is true regarding an orthographic projection  
 a. It could have as many as eight views  
 b. One view, two view, and three view drawings are the most common  
 c. There are always at least two views \*
64. The % age of silica in water is measured by a  
 a. colorimeter \* b. photometer  
 c. electro chemical equipment  
 d. conductivity cell  
 e. katharometer
65. A line used to show an edge which is not visible is a  
 a. Hidden line \* b. Phantom line  
 c. Break line
66. i. Schematic diagrams indicate the location of individual components in the aircraft  
 ii. Schematic diagrams indicate the location of components with respect to each other within the system.  
 Regarding the above statements  
 a. Both No. 1 and No. 2 are true  
 b. Only No. 1 is true c. Only No. 2 is true \*
67. Which statement is applicable when using a sketch for making a part ?  
 a. The sketch may be used only if supplemented with three view orthographic projection drawings  
 b. The sketch need not show all necessary construction details  
 c. The sketch must show all information to manufacture the part \*
68. For sketching purposes, almost all objects are composed of one or some combination of six basic shapes these include the  
 a. Triangle, plane, arc, line, square, and polygon  
 b. Angle, arc, line, plane, square and circle  
 c. Triangle, circle, cube, cylinder, cone and sphere \*
69. What should be the first step of the procedure in sketching an aircraft wing skin repair  
 a. Block in the views b. Lay out the repair \*  
 c. Draw heavy guidelines

70. i. According to 14 CFR part 91, repairs to an aircraft skin should have a detailed dimensional sketch included in the permanent records.  
 ii. On occasion, a mechanic may need to make a simple sketch of a proposed repair to an aircraft, a new design, or a modification  
 Regarding the above statements  
 a. Only No. 2 is true \*  
 b. Only No. 1 is true  
 c. Both No. 1 and No. 2 are true
71. Working drawings may be divided into three classes. They are  
 a. Detail drawings, assembly drawings, and installation drawings \*  
 b. Title drawings, installation drawings, and assembly drawings  
 c. Detail drawings, orthographic projection drawings, and pictorial drawings.
72. Sketches are usually made easier by the use of  
 a. Artist's paper  
 b. Graph paper \*  
 c. Plain white paper
73. What material symbol is frequently used in drawings to represent all metals ?  
 a. Steel  
 b. Aluminum  
 c. Cast iron \*
74. The measurements showing the ideal or "perfect" sizes of parts on drawings are called  
 a. Dimensions \*  
 b. Allowances  
 c. Tolerances
75. Zone numbers on aircraft blueprints are used to  
 a. Indicate different sections of the aircraft  
 b. Locate parts in the aircraft  
 c. Locate parts, sections, and views on large drawings\*
76. One purpose for schematic diagrams is to show the  
 a. Size and shape of components within a system  
 b. Physical location of components within a system  
 c. Functional location of components within a system\*
77. When reading a blueprint, a dimension is given as 4.387 inches + .005 - .002. Which statement is true ?  
 a. The minimum acceptable size is 4.385 inches \*  
 b. The minimum acceptable size is 4.382 inches  
 c. The maximum acceptable size is 4.390 inches
78. What is the allowable manufacturing tolerance for a bushing where the outside dimensions shown on the blueprint are 1.0625 + .0025 - .0003 ?  
 a. 1.0650  
 b. 0.0028 \*  
 c. 1.0647
79. A hydraulic system schematic drawing typically indicates the  
 a. Amount of pressure in the pressure and return lines, and in system components  
 b. Specific location of the individual components within the aircraft  
 c. Direction of fluid flow through the system \*
80. i. A measurement should not be scaled from an aircraft print because the paper shrinks or stretches when the print is made  
 ii. When a detail drawing is made, it is carefully and accurately drawn to scale, and is dimensioned  
 Regarding the above statements  
 a. Only No. 2 is true  
 b. Neither No. 1 nor No. 2 is true  
 c. Both No. 1 and No. 2 are true \*
81. The drawings often used in illustrated parts manuals are  
 a. Exploded view drawings \*  
 b. Detail drawings  
 c. Block drawings
82. A drawing in which the subassemblies or parts are shown as brought together on the aircraft is called  
 a. A detail drawing  
 b. An installation drawing \*  
 c. A Sectional drawing
83. What type of diagram shows the wire size required for a particular installation ?  
 a. A schematic diagram  
 b. A block diagram  
 c. A wiring diagram \*
84. Schematic diagrams are best suited for which of the following ?  
 a. Trouble shooting system malfunctions \*  
 b. Showing the visual details of individual components in a system  
 c. Showing the overall location and appearance of components in a system
85. In the reading of aircraft blueprints, the term "tolerance", used in association with aircraft parts or components  
 a. Is the difference between extreme permissible dimensions that a part may have and still be acceptable \*  
 b. Is the tightest permissible fit for proper construction and operation of mating parts  
 c. Represents the limit of galvanic compatibility between different adjoining material types in aircraft parts
86. When computing weight and balance, an airplane is considered to be in balance when  
 a. The average moment arm of the loaded airplane falls within its CG range \*  
 b. The movement of the passengers will not cause the moment arms to fall outside the CG range  
 c. All moment arms of the plane fall within CG range

87. What tasks are completed prior to weighing an aircraft to determine its empty weight
- Remove all items except those on the aircraft equipment list drain fuel and hydraulic fluid
  - Remove all items on the aircraft equipment list drain fuel compute oil and hydraulic fluid weight
  - Remove all items except those on the aircraft equipment list drain fuel and fill hydraulic reservoir\*
88. The useful load of an aircraft consists of the
- Crew, usable fuel, oil, and fixed equipment
  - Crew, usable fuel, passengers and cargo \*
  - Crew, passengers, usable fuel, oil, cargo, and fixed equipment
89. Which of the following can provide the empty weight of an aircraft if the aircraft's weight and balance records become lost, destroyed, or otherwise inaccurate ?
- Reweighting the aircraft \*
  - The applicable flight manual or pilots operating handbook
  - The applicable aircraft specification or type certificate data sheet
90. In the theory of weight and balance, what is the name of the distance from the fulcrum to an object ?
- Fulcrum arm
  - Lever arm \*
  - Balance arm
91. i. Private aircraft are required by regulations to be weighed periodically  
ii. Private aircraft are required to be weighed after making any alteration  
Regarding the above statements
- Neither No. 1 nor No. 2 is true \*
  - Only No. 2 is true
  - Only No. 1 is true
92. What FAA approved document gives the leveling means to be used when weighing an aircraft ?
- Manufacturer's maintenance manual
  - Type certificate data sheet
  - AC 43.13-1B \*
93. To obtain useful weight data for purposes of determining the CG, it is necessary that an aircraft be weighed
- With no more than minimum fuel (1/12 gallon per meto horsepower) in all fuel tanks
  - In a level flight attitude \*
  - With all items of useful load installed
94. What type of measurement is used to designate the arm in weight and balance computation ?
- Weight x distance
  - Distance \*
  - Weight
95. What determines whether the value of the moment is preceded by a plus (+) or a minus (-) sign in aircraft weight and balance ?
- The result of a weight being added or removed and its location relative to the datum
  - The location of the weight in reference to the datum\*
  - The location of the datum in reference to the aircraft CG
96. The maximum weight of an aircraft is the
- Empty weight plus crew, maximum fuel, cargo and baggage
  - Empty weight plus useful load \*
  - Empty weight plus crew, passengers, and fixed equipment
97. Which statement is true regarding helicopter weight and balance ?
- Regardless of internal or external loading, later axis cg control is ordinarily not a factor in maintaining helicopter weight and balance
  - The moment of tail mounted components is subject to constant change
  - Weight and balance procedures for airplanes generally also apply to helicopters \*
98. What should be clearly indicated on the aircraft weighing form ?
- Weighing points \*
  - Weight of unusable fuel
  - Minimum allowable gross weight
99. If the reference datum line is placed at the nose of an airplane rather than at the firewall or some other location aft of the nose
- All measurement arms will be in positive numbers\*
  - All measurement arms will be in negative numbers
  - Measurement arms can be either positive or negative numbers depending on the manufacturer's preference
100. Zero fuel weight is the
- Basic operating weight without crew, fuel and cargo
  - Dry weight plus the weight of full crew, passengers, and cargo
  - Maximum permissible weight of a loaded aircraft (passengers, crew, and cargo) without fuel \*
101. The empty weight of an airplane is determined by
- Multiplying the measured distance from each weighing point to the datum times the sum of scale reading less the tare weight
  - Subtracting the tare weight from the scale reading and adding the weight of each weighing point \*
  - Adding the net weight of each weighing point and multiplying the measured distance to the datum
102. When dealing with weight and balance of an aircraft, the term "maximum weight" is interpreted to mean the maximum
- Weight of the empty aircraft
  - Authorized weight of the aircraft and its contents\*
  - Weight of the useful load

103. The useful load of an aircraft is the
- Difference between the maximum gross weight and empty weight \*
  - Difference between the net weight and total weight
  - Sum of the empty weight and the maximum gross weight
104. When determining the empty weight of an aircraft, certificated under current airworthiness standards (14 CFR Part 23), the oil contained in the supply tank is considered
- A part of the useful load
  - A part of the empty weight \*
  - The same as the fluid contained in the water injection reservoir
105. Improper loading of a helicopter which results in exceeding either the fore or aft CG limits is hazardous due to the
- Reduction or loss of effective cyclic pitch control\*
  - Reduction or loss of effective collective pitch control
  - Coriolis effect being translated to the fuselage
106. The maximum weight as used in weight and balance control of a given aircraft can normally be found
- By adding the weight of full fuel, pilot, passengers, and maximum allowable baggage to the empty weight
  - In the Aircraft specification or type certificate data sheet \*
  - By adding the empty weight and payload
107. An aircraft with an empty weight of 2,100 pounds and an empty weight CG +32.5 was altered as follows
- Two 18 pound passenger seats located at +73 were removed
  - Structural modifications were made at + 77 increasing weight by 17 pounds
  - A seat and safety belt weighing 25 pounds were installed at +74.5; and
  - Radio equipment weighing 35 pounds was installed at +95.
- What is the new empty weight CG
- +34.01
  - +33.68 \*
  - +34.65
108. The CG range in single rotor helicopters is
- More restricted than for airplanes \*
  - Much greater than for airplanes
  - Approximately the same as the CG range for airplanes
109. The amount of fuel used for computing empty weight and corresponding CG is
- The amount of fuel necessary for 1/2 hour of operation
  - Empty fuel tanks
  - Unusable fuel \*
110. An aircraft as loaded weights 4,954 pounds at a CG of + 30.5 inches. The CG range is + 32.0 inches to + 42.1 inches. Find the minimum weight of the ballast necessary to bring the CG within the CG range. The ballast arm is + 162 inches
- 57.16 pounds \*
  - 61.98 pounds
  - 30.58 pounds
111. As weighed, the total empty weight of an aircraft is 5,862 pounds with a moment of 885,957. However, when the aircraft was weighed, 20 pounds of potable water were on board at + 84, and 23 pounds of hydraulic fluid were in a tank located at + 101. What is the empty weight CG of the aircraft ?
- 150.700
  - 151.700
  - 151.365 \*
112. Two boxes which weigh 10 pounds and 5 pounds are placed in an airplane so that their distance aircraft from the CG are 4 feet and 2 feet pounds, be placed so that the CG will not be changed ?
- 2.5 feet \*
  - 3 feet
  - 8 feet
113. An aircraft with an empty weight of 1,800 pounds and an empty weight CG of + 31.5 was altered as follows:
- Two 15 pound passenger seats located at + 72 were removed
  - Structural modifications increasing the weight 14 pounds were made at + 76
  - A seat and safety belt weighing 20 pounds were installed at + 73.5 and
  - Radio equipment weighing 30 pounds was installed at + 30. What is the new empty weight CG ?
- +30.61
  - +31.61 \*
  - +32.69
114. An aircraft has an empty weight of 2,886 pounds with a moment of 101,673.78 before several alterations were made. The alterations included :
- Removing two passenger seats (15 pounds each) at + 71
  - Installing a cabinet (97 pounds) at + 71
  - Installing a seat and safety belt (20 pounds) at + 71 and
  - Installing radio equipment (30 pounds) at + 94
- The alterations caused the new empty weight CG to move
- 1.62 inches aircraft of the original empty weight CG\*
  - 2.03 inches aircraft of the original empty weight CG
  - 2.03 inches forward of the original empty weight CG
115. If a 40 pound generator applies + 1400 inch pounds to a reference axis, the generator is located
- 35 from the axis
  - + 25 from the axis
  - + 35 from the axis \*

116. In a balance computation of an aircraft from which an item located aircraft of the datum was removed, use
- (-) weight x (+) arm (-) moment \*
  - (-) weight x (-) arm (+) moment
  - (+) weight x (-) arm (-) moment
117. Datum is forward of the main gear center point 30.24 inches. Actual distance between tail gear and main gear center points 360.26 inches  
 Net weight at right main gear 9,980 pounds  
 Net weight at left main gear 9,770 pounds  
 Net weight at tail gear 1,970 pounds  
 These items were in the aircraft when weighed :
- Lavatory water tank full (34 pounds at +353)
  - Hydraulic fluid (22 pounds at -8)
  - Removable ballast (146 pounds at +380)
- What is the empty weight CG of the aircraft described above ?
- 58.54 inches
  - 60.31 inches \*
  - 62.92 inches
118. When making a rearward weight and balance check to determine that the CG will not exceed the rearward limit during extreme conditions, the items of useful load which should be computed at their minimum weights are those located forward of the
- Datum
  - Rearward CG limit \*
  - Forward CG limit
119. When an empty aircraft is weighed, the combined net weight at the main gears is 3,540 pounds with an arm of 195.5 inches. At the nose gear, the net weight is 2,322 pounds with an arm of 83.5 inches. The datum line is forward of the nose of the aircraft. What is the empty CG of the aircraft ?
- 146.5
  - 151.1 \*
  - 155.2
120. An aircraft with an empty weight of 1,500 pounds and an empty weight CG of + 28.4 was altered as follows:
- Two 12 pound seats located at + 68.5 were removed
  - Structural modifications weighing + 28 pounds were made at + 73
  - A seat and safety belt weighing 30 pounds were installed at + 70.5 and
  - Radio equipment weighing 25 pounds was installed at + 85
- What is the new empty weight CG ?
- +23.51
  - +31.35
  - +30.30 \*
121. The following alteration was performed on an aircraft: A model B engine weighing 175 pounds was replaced by a model D engine weighing 185 pounds at a -62.00 inch station. The aircraft weight and balance records show the previous empty weight to be 990 pounds and an empty weight CG of 13.48 inches. What is the new empty weight CG ?
- 13.96 inches
  - 14.25 inches
  - 12.73 inches \*
122. If the empty weight CG of an airplane lies within the empty weight CG limits
- Minimum fuel should be used in both forward and rearward CG checks
  - It is not necessary to calculate CG extremes \*
  - It is necessary to calculate CG extremes
123. When computing the maximum forward loaded CG of an aircraft, minimum weights, arms, and moments should be used for items of useful load that are located aircraft of the
- Forward CG limit \*
  - Datum
  - Rearward CG limit
124. Find the empty weight CG location for the following tricycle gear aircraft. Each main wheel weighs 753 pounds, nosewheel weighs 22 pounds, distance between nosewheel and main wheels is 87.5 inches, nosewheel location is +9.875 inches from datum, with 1 gallon of hydraulic fluid at -21.0 inches included in the weight scale
- +97.375 inches
  - +96.11 inches \*
  - +95.61 inches
125. Which coupling nut should be selected for use with 1/2 inch aluminum oil lines which are to be assembled using flared tube ends and standard AN nuts, sleeves, and fittings ?
- AN-818-5
  - AN-818-16
  - AN-818-8 \*
126. Metal tubing fluid lines are sized by wall thickness and
- Outside diameter in 1/32 inch increments
  - Inside diameter in 1/16 inch increments
  - Outside diameter in 1/16 inch increments \*
127. From the following sequences of steps, indicate the proper order you would use to make a single flare on a piece of tubing :
- Place the tube in the proper size hole in the flaring block
  - Project the end of the tube slightly from the top of the flaring tool, about the thickness of a dime
  - Slip the fitting nut and sleeve on the tube
  - Strike the plunger several light blows with a lightweight hammer or mallet and turn the plunger one half turn after each blow
  - Tighten the clamp bar securely to prevent slippage
  - Center the plunger or flaring pin over the tube
- 1,3,5,2,4,6
  - 3,1,6,2,5,4 \*
  - 3,1,2,6,5,4
128. Hydraulic tubing, which is damaged in a localized area to such an extent that repair is necessary, may be repaired
- By cutting out the damaged section and soldering in a replacement
  - By cutting out the damaged area and utilizing a swagged tube fitting to join the tube ends \*
  - Only by replacing the entire tubing using the same size and material as the original



129. What is an advantage of a double flare on aluminum tubing ?
- It is more resistant to the shearing effect of torque\*
  - Ease of construction
  - It is less resistant to the shearing effect of torque
130. A certain amount of slack must be left in a flexible hose during installation because, when under pressure, it
- Expands in length and diameter
  - Contracts in length and expands in diameter \*
  - Expands in length and contracts in diameter
131. A certain amount of slack must be left in a flexible hose during installation because, when under pressure, it
- Expands in length and expands in diameter
  - Contracts in length and expands in diameter \*
  - Expands in length and contracts in diameter
132. The term "cold flow" is generally associated with
- Vaporizing fuel
  - Rubber hose \*
  - Welding and sheet metal
133. What is the color of an AN steel flared tube fitting?
- Black \*
  - Blue
  - Red
134. Select the correct statement in reference to flare fittings
- An fittings can easily be identified by the shoulder between the end of the threads and the flare cone\*
  - AC fittings are generally replacing the older AN fittings
  - AC and AN fittings are identical except for material composition and identifying colors
135. Flexible lines must be installed with
- A slack of at least 10 to 12 percent of the length
  - A slack of 5 to 8 percent of the length \*
  - Enough slack to allow maximum flexing during operation
136. The maximum distance between end fittings to which a straight hose assembly is to be connected is 50 inches. The minimum hose length to make such a connection should be
- 54 -1/2 inches
  - 51 -1/2 inches
  - 52 -1/2 inches \*
137. Excessive stress on fluid or pneumatic metal tubing cause by expansion and contraction due to temperature changes can best be avoided by
- Using short, straight sections of tubing between fixed parts of the aircraft
  - Not subjecting the aircraft to sudden changes in temperature
  - Providing bends in the tubing \*
138. The material specifications for a certain aircraft require that a replacement oil line be fabricated from 3/4 -inch 0.072 5052-0 aluminum alloy tubing. What is the inside dimension of this tubing ?
- 0.750 inch
  - 0.688 inch
  - 0.606 inch \*
139. In most aircraft hydraulic systems, two piece tube connectors consisting of a sleeve and a nut are used when a tubing flare is required. The use of this type connector eliminates
- The possibility of reducing the flare thickness by wiping or ironing during the tightening process \*
  - The flaring operation prior to assembly
  - Wrench damage to the tubing during the tightening process
140. Which statement about Military standard (MS) flareless fittings is correct ?
- MS flareless fittings should not be lubricated prior to assembly
  - During installation, MS flareless fittings are normally tightened by turning the nut a specified amount after the sleeve and fitting sealing surface have made contact, rather than being torqued \*
  - MS flareless fittings must be tightened to a specific torque
141. When flaring aluminum tubing for use with AN fittings, the flare angle must be
- 37° \*
  - 35°
  - 45°
142. Scratches or nicks on the straight portion of aluminum alloy tubing may be repaired if they are no deeper than
- 1/32 inch or 20 percent of wall thickness, whichever is less
  - 20 percent of the wall thickness
  - 10 percent of the wall thickness \*
143. Flexible hose used in aircraft systems is classified in size according to the
- Wall thickness
  - Inside diameter \*
  - Outside diameter
144. A scratch or nick in aluminum alloy tubing can be repaired by burnishing provided the scratch or nick does not
- Exceed 20 percent of the wall thickness of the tube
  - Exceed 10 percent of the tube diameter
  - Appear in the heel of a bend in the tube \*
145. Which of the following hose materials are compatible with phosphate-ester base hydraulic fluids ?
- Butyl
  - Teflon
  - Buna-N
  - Neoprene
- 1 and 2 \*
  - 1 and 3
  - 2 and 4
146. Which tubings have the characteristics (high strength, abrasion resistance) necessary for use in a high pressure (3,000 PSI) hydraulic system for operation of landing gear and flaps ?
- 2024 -T or 5052-0 aluminum alloy
  - Corrosion resistant steel annealed or 1/4H \*
  - 1100-1/2H or 3003-1/2H aluminum alloy

147. When installing bonded clamps to support metal tubing
- Paint removal from tube is not recommended as it will inhibit corrosion
  - Remove paint or anodizing from tube at clamp location \*
  - Paint clamp and tube after clamp installation to prevent corrosion
148. In a metal tubing installation
- Tension is undesirable because pressurization will cause it to expand and shift \*
  - A tube may be pulled in line if the nut will start on the threaded coupling
  - Rigid straight line runs are preferable
149. A gas or fluid line marked with the letters PHDAN
- Is carrying a substance which may dangerous to personnel \*
  - Is carrying a substance that cannot be made non-toxic
  - Is a high pressure line. The letters mean pressure high, discharge at Nacelle
150. Which statement concerning Bernoulli's principle is true ?
- The pressure of a fluid decreases at points where the velocity of the fluid increases \*
  - It applies only to gases and vaporized liquids
  - The pressure of a fluid increases at points where the velocity of the fluid increases
151. i. Bonded clamps are used for support when installing metal tubing  
ii. Unbonded clamps are used for support when installing wiring.  
Regarding the above statements
- Neither No. 1 No. 2 is true
  - Both No. 1 and No. 2 are true \*
  - Only No. 1 is true
152. A 3/8 inch aircraft high pressure flexible hose as compared to 3/8 inch metal tubing used in the same system will
- Usually have interchangeable applications
  - Have equivalent flow characteristics \*
  - Have about the same OD
153. Magnetic particle inspection is used primarily to detect
- Flaws on or near the surface \*
  - Distortion
  - Deep subsurface flaws
154. Liquid penetrant inspection methods may be used on which of the following ?
- Porous plastics
  - Ferrous metals
  - Nonferrous metals
  - Nonporous plastics
  - Smooth unpainted wood
- 1,2,3
  - 2,3,4 \*
  - 2,3,5
155. Which of these nondestructive testing methods is suitable for the inspection of most metals, plastics, and ceramics for surface and subsurface defects ?
- Ultrasonic inspection \*
  - Magnetic particle inspection
  - Eddy current inspection
156. What nondestructive testing method requires little or no part preparation, is used to detect surface or near surface defects in most metals, and may also be used to separate metals or alloys and their heat treat conditions ?
- Magnetic particle inspection
  - Eddy current inspection \*
  - Ultrasonic inspection
157. What method of magnetic particle inspection is used most often to inspect aircraft parts for invisible cracks and other defects ?
- Inductance
  - Continuous \*
  - Residual
158. How many of these factors are considered essential knowledge of x ray exposure ?
- Processing of the film
  - Material thickness and density
  - Exposure distance and angle
  - Film characteristics
- One
  - Three \*
  - Four
159. The testing medium that is generally used in magnetic particle inspection utilizes a ferromagnetic material that has
- High permeability and low retentivity \*
  - Low permeability and high retentivity
  - High permeability and high retentivity
160. Which statement relating to the residual magnetizing inspection method is true ?
- It may be used with steels which have been heat treated for stressed applications.\*
  - Subsurface discontinuities are made readily apparent
  - It is used in practically all circular and longitudinal magnetizing procedures
161. A mechanic has completed a bonded honeycomb repair using the potted compound repair technique. What nondestructive testing method is used to determine the soundness of the repair after the repair has cured?
- Ultrasonic test
  - Metallic ring test \*
  - Eddy current test
162. What two types of indicating mediums are available for magnetic particle inspection ?
- High retentivity and low permeability material
  - Wet and dry process materials \*
  - Iron and ferric oxides

163. Which of the following materials may be inspected using the magnetic particle inspection method ?
- Magnesium alloys
  - Aluminum alloys
  - Iron alloys
  - Copper alloys
  - Zinc alloys
- 3 \*
  - 1, 2, 4, 5
  - 1, 2, 3
164. One way a part may be demagnetized after magnetic particle inspection is by
- Slowly moving the part into an ac magnetic field of sufficient strength
  - Subjecting the part to high voltage, low amperage AC
  - Slowly moving the part out of an AC magnetic field of sufficient strength \*
165. Which type crack can be detected by magnetic particle inspection using either circular or longitudinal magnetization ?
- 45° \*
  - Longitudinal
  - Transverse
166. Which of the following methods may be suitable to use to detect cracks open to the surface in aluminum forgings and castings ?
- Dye penetrant inspection
  - Magnetic particle inspection
  - Metallic ring (coin tap) inspections
  - Eddy current inspection
  - Ultrasonic inspection
  - Visual inspection
- 1, 2, 3, 4, 5, 6
  - 1, 4, 5, 6 \*
  - 1, 2, 4, 5, 6
167. To detect a minute crack using dye penetrant inspection usually requires
- That the developer be applied to a flat surface
  - A longer than normal penetrating time \*
  - The surface to be highly polished
168. When checking an item with the magnetic particle inspection method, circular and longitudinal magnetization should be used to
- Reveal all possible defects \*
  - Evenly magnetize the entire part
  - Ensure uniform current flow
169. In magnetic particle inspection, a flaw that is perpendicular to the magnetic field flux lines generally causes
- No disruption in the magnetic field
  - A minimal disruption in the magnetic field
  - A large disruption in the magnetic field \*
170. If dye penetrant inspection indications are not sharp and clear, the most probable cause is that the part
- Has no appreciable damage
  - Was not thoroughly washed before the developer was applied \*
  - Was not correctly degaussed before the developer was applied
171. i. An aircraft part may be demagnetized by subjecting it to a magnetizing force from alternating current that is gradually reduced in strength.  
ii. An aircraft part may be demagnetized by subjecting it to a magnetizing force from direct current that is alternately reversed in direction and gradually reduced in strength
- Regarding the above statements
- Both No. 1 and No. 2 are true \*
  - Only No. 1 is true
  - Only No. 2 is true
172. The pattern for an inclusion is a magnetic particle buildup forming
- Parallel lines \*
  - A fernlike pattern
  - A single line
173. A part which is being prepared for dye penetrant inspection should be cleaned with
- A volatile petroleum base solvent \*
  - The penetrant developer
  - Water base solvents only
174. Under magnetic particle inspection, a part will be identified as having a fatigue crack under which condition ?
- The discontinuity is found in a highly stressed area of the part \*
  - The discontinuity is found in a non-stressed area of the part
  - The discontinuity pattern is straight
175. In performing a dye penetrant inspection, the developer
- Seeps into a surface crack to indicate the presence of a defect
  - Acts as a blotter to produce a visible indication \*
  - Thoroughly cleans the surface prior to inspection
176. What defects will be detected by magnetizing a part using continuous longitudinal magnetization with a cable ?
- Defects parallel to the concentric circles of magnetic force within the part
  - Defects parallel to the long axis of the part \*
  - Defects perpendicular to the long axis of the part
177. Circular magnetization of a part can be used to detect which defects ?
- Defects perpendicular to the concentric circles of magnetic force within the part
  - Defects parallel to the long axis of the part \*
  - Defects perpendicular to the long axis of the part
178. i. In nondestructive testing, a discontinuity may be defined as an interruption in the normal physical structure or configuration of a part  
ii. A discontinuity may or may not affect the usefulness of a part
- Regarding the above statements
- Only No. 1 is true
  - Only No. 2 is true
  - Both No. 1 and No. 2 are true \*

179. Which of the following describe the effects of annealing steel and aluminum alloys ?
- Decrease in internal stress
  - Softening of the metal
  - Improved corrosion resistance
- 1,3
  - 2,3
  - 1,2 \*
180. Which heat treating process of metal produces a hard, wear resistant surface over a strong, tough core ?
- Annealing
  - Tempering
  - Case hardening \*
181. Which heat treating operation would be performed when the surface of the metal is changed chemically by introducing a high carbide or nitride content ?
- Tempering
  - Case hardening \*
  - Normalizing
182. Normalizing is a process of heat treating
- Iron base metals only \*
  - Both aluminum alloys and iron base metals
  - Aluminum alloys only
183. When a mechanical force is repeatedly applied to most metals at room temperature, such as rolling, hammering, or bending, the metals become
- Cold worked, strain or work hardened \*
  - Stress corrosion cracked
  - Artificially aged
184. The reheating of a heat treated metal, such as with a welding torch
- Can significantly alter a metal's properties in the reheated area \*
  - Has little or no effect on a metal's heat treated characteristics
  - Has a cumulative enhancement effect on the original heat treatment
185. Why is steel tempered after being hardened ?
- To increase its hardness and ductility
  - To increase its strength and decrease its internal stresses
  - To relieve its internal stresses and reduce its brittleness \*
186. What aluminum alloy designations indicate that the metal has received no hardening or tempering treatment ?
- 3003-F
  - 6061-0 \*
  - 5052-H36
187. Which material cannot be heat treated repeatedly without harmful effects ?
- Unclad aluminum alloy in sheet form
  - 6061-T9 stainless steel
  - Clad aluminum alloy \*
188. What is descriptive of the annealing process of steel during and after it has been annealed ?
- Slow cooling; low strength
  - Rapid cooling; high strength
  - Slow cooling; increased resistance to wear \*
189. Unless otherwise specified, torque values for tightening aircraft nuts and bolts relate to
- Either dry or lightly oiled threads
  - Clean, dry threads \*
  - Clean, lightly oiled threads
190. What is generally used in the construction of aircraft engine firewalls ?
- Stainless steel \*
  - Chrome molybdenum alloy steel
  - Magnesium titanium alloy steel
191. Unless otherwise specified or required, aircraft bolts should be installed so that the bolthead is
- Downward, or in a rearward direction
  - Upward, or in a forward direction \*
  - Downward, or in a forward direction
192. Alclad is a metal consisting of
- Pure aluminum surface layers on an aluminum alloy core \*
  - A homogeneous mixture of pure aluminum and aluminum alloy
  - Aluminum alloy surface layers and a pure aluminum core
193. A fiber type, self locking nut must never be used on an aircraft if the bolt is
- Under tension loading
  - Under shear loading
  - Subject to rotation \*
194. The society of automotive engineers (SAE) and the American Iron and steel institute use a numerical index system to identify and composition of various steels. In the number "4130" designating chromium molybdenum steel, and first digit indicates the
- Percentage of the basic element in the alloy
  - Basic alloying element
  - Percentage of carbon in the alloy in hundredths of a percent \*
195. Aircraft bolts with a cross or asterisk marked on the bolthead are
- Standard steel bolts \*
  - Close tolerance bolts
  - Made of aluminum alloy
196. Which statement regarding aircraft bolts is correct ?
- In general, bolt grip lengths should equal the material thickness \*
  - When tightening castellated nuts on drilled bolts, if the cotter pin holes do not line up, it is permissible to tighten the nut up to 10 percent over recommended torque to permit alignment of the next slot with the cotter pin hole
  - Alloy steel bolts smaller than 1/4 inch diameter should not be used in primary structure

197. Generally speaking, bolt grip lengths should be
- Equal to the thickness of the material which is fastened together, plus approximately one diameter
  - One and One half times the thickness of the material which is fastened together
  - Equal to the thickness of the material which is fastened together \*
198. When the specific torque value for nuts is not given, where can the recommended torque value be found ?
- AC 43.13-1B \*
  - Technical standard order
  - AC 43.13-2A
199. A particular component is attached to the aircraft structure by the use of an aircraft bolt and a castle tension nut combination. If the cotter pin hole does not align within the recommended torque range, the acceptable practice is to
- Change washers and try again \*
  - Exceed the recommended torque range by no more than 10 percent
  - Tighten below the torque range
200. A bolt with a single raised dash on the head is classified as an
- NAS close tolerance bolt
  - NAS standard aircraft bolt
  - AN corrosion resistant steel bolt \*
201. How is a clevis bolt used with a fork end cable terminal secured ?
- With a castle nut tightened until slight binding occurs between the fork and the fitting to which it is being attached \*
  - With a shear nut and cotter pin or a thin self locking nut tightened enough to prevent rotation of the bolt in the fork
  - With a shear nut tightened to a snug fit, but with no strain imposed on the fork and safetied with a cotter pin
202. Where is an AN clevis bolt used in an airplane ?
- Where external tension loads are applied
  - Only for shear load applications \*
  - For tension and shear load condition
203. A bolt with an X inside a triangle on the head is classified as an
- NAS standard aircraft bolt
  - AN corrosion resistant steel bolt
  - NAS close tolerance bolt \*
204. The core material of Alclad 2024 -T4 is
- Strain hardened aluminum alloy, and the surface material is commercially pure aluminum
  - Heat treated aluminum alloy, and the surface material is commercially pure aluminum \*
  - Commercially pure aluminum, and the surface material is heat treated aluminum alloy
205. The aluminum code number 1100 identifies what type of aluminum ?
- 99 percent commercially pure aluminum \*
  - Aluminum alloy containing zinc
  - Aluminum alloy containing 11 percent copper
206. Aircraft bolts usually manufactured with a
- Class 1 fit for the threads
  - Class 2 fit for the threads
  - Class 3 fit for the threads \*
207. In the four digit aluminum index system number 2024, the first digit indicates
- The percent of alloying metal added
  - The major alloying element \*
  - The number of major alloying elements used in the metal
208. How is the locking feature of the fiber type locknut obtained ?
- By the use of an unthreaded fiber locking insert
  - By a fiber insert held firmly in place at the base of the load carrying section
  - By making the threads in the fiber insert slightly smaller than those in the load carrying section \*
209. Why is it considered good practice to normalize a part after welding ?
- To increase the hardness of the weld
  - To remove the surface scale formed during welding\*
  - Grind the rough surface smooth, inspect, and reweld all gaps/holes
210. Which condition indicates a part has cooled too quickly after being welded ?
- Cracking adjacent to the weld \*
  - Gas pockets, porosity, and slag inclusions
  - Discoloration of the base metal
211. Select a characteristic of a good gas weld
- The height of the weld bead should be 1/8 inch above the base metal
  - The depth of penetration shall be sufficient to ensure fusion of the filler rod
  - The weld should taper off smoothly into the base metal \*
212. One characteristic of a good weld is that no oxide should be formed on the base metal at a distance from the weld of more than
- 1/2 inch \*
  - 1 inch
  - 1/4 inch
213. System function is expressed as
- Response function
  - Excitation function
  - a/b \*
  - b/a
  - characteristic equation
214. On a fillet weld, the penetration requirement includes what percentage (a) of the base metal thickness ?
- 100 percent
  - 25 to 50 percent \*
  - 60 to 80 percent

215. Which tool can be used to measure the alignment of a rotor shaft or the plane of rotation of a disk ?  
 a. Shaft gauge                      b. Dial indicator \*  
 c. Protractor
216. Identify the correct statement  
 a. Tools used on certificated aircraft must be an approved type \*  
 b. Dividers do not provide a reading when used as a measuring device  
 c. An outside micrometer is limited to measuring diameters
217. Which tool is used to measure the clearance between a surface plate and a relatively narrow surface being checked for flatness ?  
 a. Thickness gauge \*      b. Dial indicator  
 c. Depth gauge
218. Which number represents the vernier scale graduation of a micrometer ?  
 a. .00001                      b. .0001\*  
 c. .001
219. Which tool is used to find the center of a shaft or other cylindrical work ?  
 a. Dial indicator              b. Micrometer caliper  
 c. Combination set \*
220. The steady state output of the system to input sinusoids of varying frequency is referred to as  
 a. frequency response of a system \*  
 b. Nyquist plot              c. Bode plot  
 d. transient response      e. logarithmic plot
221. If it is necessary to accurately measure the diameter of a hole approximately 1/4 inch in diameter, the mechanic should use a  
 a. Small hole gauge and determine the size of the hole by taking a micrometer reading of the ball end of the gauge  
 b. 0 to 1 inch inside micrometer and read the measurement directly from the micrometer \*  
 c. Telescoping gauge and determine the size of the hole by taking a micrometer reading of the adjustable end of the telescoping gauge
222. What tool is generally used to set a divider to an exact dimension ?  
 a. Surface gauge              b. Dial indicator  
 c. Machinist scale \*
223. What tool is generally used to calibrate a micrometer or check its accuracy ?  
 a. Machinist scale              b. Dial indicator  
 c. Gauge block \*
224. What precision measuring tool is used for measuring crankpin and main bearing journals for out of round wear ?  
 a. Depth gauge              b. Dial gauge \*  
 c. Micrometer caliper
225. The side clearances of piston rings are measured with  
 a  
 a. Dial gauge  
 b. Thickness gauge \*  
 c. Micrometer caliper gauge
226. How can the dimensional inspection of a bearing in a rocker arm be accomplished ?  
 a. Telescopic gauge and micrometer \*  
 b. Thickness gauge and push fit arbor  
 c. Depth gauge and micrometer
227. The twist of a connecting rod is checked by installing push fit arbors in both ends, supported by parallel steel bars on a surface plate. Measurements are taken between the arbor and the parallel bar with a  
 a. Dial gauge \*  
 b. Thickness gauge  
 c. Height gauge
228. The clearance between the piston rings and the ring lands is measured with a  
 a. Thickness gauge \*  
 b. Micrometer caliper  
 c. Depth gauge
229. What may be used to check the stem on a poppet type valve for stretch  
 a. Telescoping gauge  
 b. Micrometer \*  
 c. Dial indicator
230. Which tool can be used to determine piston pin out of round wear ?  
 a. Dial indicator \*  
 b. Micrometer caliper  
 c. Telescopic gauge
231. During starting of a turbine powerplant using a compressed air starter, a hung start occurred. Select the proper procedure  
 a. Shut the engine down \*  
 b. Re-engage the starter  
 c. Advance power lever to increase RPM
232. A hung start in a jet engine is often caused by  
 a. Malfunctions in the ignition system  
 b. An excessively rich fuel / air mixture  
 c. The starter cutting off too soon \*
233. Which statement below reflects a typical requirement when towing some aircraft ?  
 a. If the aircraft has a steerable nosewheel, the torque-link lock should be set to full swivel \*  
 b. Tailwheel aircraft must be towed backwards  
 c. Discharge all hydraulic pressure to prevent accidental operation of the nosewheel steering mechanism

234. Which statements is /are true regarding tiedown of small aircraft ?
- Manila (hemp) rope has a tendency to stretch when it gets wet
  - Nylon or dacron rope is preferred to manila rope
  - The aircraft would be headed downwind in order to eliminate or minimize wing lift
  - Leave the nosewheel or tailwheel unlocked
- 2
  - 1, 2, 3, and 4
  - 1 and 2 \*
235. When approaching the front of an idling jet engine, the hazard area extends forward of the engine approximately
- 25 feet \*
  - 15 feet
  - 10 feet
236. Which of the following is the most satisfactory extinguishing agent for use on a carburetor or intake fire ?
- A fine, water mist
  - Dry chemical
  - Carbondioxide \*
237. If a radial engine has been shut down for more than 30 minutes, the propeller should be rotated through at least two revolutions to
- Check for hydraulic lock \*
  - Check for leaks
  - Prime the engine
238. The priming of a fuel injected horizontally opposed engine is accomplished by placing the fuel control lever in the
- Idle cutoff position \*
  - Full rich position
  - Auto rich position
239. The most important condition to be monitored during start after fuel flow begins in a turbine engine is the
- Oil pressure
  - RPM
  - EGT, TIT, or ITT \*
240. How is a flooded engine, equipped with a float type carburetor, cleared of excessive fuel ?
- Crank the engine with the starter or by hand, with the mixture control in cut off, ignition switch off, and the throttle fully open, until the fuel charge has been cleared \*
  - Crank the engine with the starter or by hand, with the mixture control in cutoff, ignition switch on, and the throttle fully open until the excess fuel has cleared or until the engine starts
  - Turn off the fuel and the ignition. Discontinue the starting attempt until the excess fuel has cleared
241. Generally, when an induction fire occurs during starting of a reciprocating engine, the first course of action should be to
- Close the throttle
  - Continue cranking and start the engine if possible\*
  - Discharge carbondioxide from a fire extinguisher into the air intake of the engine
242. When starting and ground operating an aircraft's engine, the aircraft should be positioned to head into the wind primarily
- To help cancel out engine torque effect
  - For engine cooling purposes \*
  - To aid in achieving and maintaining the proper air and fuel mixture flow in the engine
243. If a hot start occurs during starting of a turbine powerplant, what is the likely cause ?
- The fuel/air mixture was excessively rich \*
  - The ambient air temperature was too high (over 100 degrees F)
  - The starting unit overheated
244. What effect will aviation gasoline mixed with jet fuel have on a turbine engine ?
- The tetraethyl lead in the gasoline forms deposits on the turbine blades \*
  - No appreciable effect
  - The tetraethyl lead in the gasoline forms deposits on the compressor blades
245. i. Jet fuel is of higher viscosity than aviation gasoline and therefore holds contaminants better  
ii. Viscosity has no relation to contamination of fuel
- Regarding the above statements
- Only No. 1 is true \*
  - Neither No. 1 nor No. 2 is true
  - Both No. 1 and No. 2 are true
246. When towing a large aircraft
- A person should be in the cockpit to operate the brakes \*
  - A person should be in the cockpit to watch for obstructions
  - Persons should be stationed at the nose, each wingtip, and the empennage at all times
247. When taxiing an airplane with a quartering tailwind, the elevators are
- Upwind aileron should be held in the down position
  - Both ailerons should be kept in the neutral position\*
  - Upwind aileron should be held in the up position
248. When taxiing (or towing) an aircraft, a flashing red light from the control tower means
- Move clear of the runway / taxiway immediately \*
  - Stop and wait for a green light
  - Return to starting point
249. A person should approach or leave a helicopter in the pilot's field of vision whenever the engine is running in order to avoid
- The main rotor
  - The tail rotor \*
  - Blowing dust or debris caused by rotor downwash
250. When taxiing (or towing) an aircraft, a flashing white light from the control tower means
- Ok to proceed but use extreme caution
  - Move clear of the runway/taxiway immediately
  - Return to starting point \*

251. When taxiing (or towing) an aircraft, an alternating red and green light from the control tower means
- Move clear of the runway/taxiway immediately
  - Return to starting point
  - Ok to proceed but use extreme caution \*
252. When stopping a nosewheel type airplane after taxiing, the nosewheel should be left
- Turned at a small angle
  - Unlocked
  - Pointed straight ahead \*
253. When first starting to move an aircraft while taxiing, it is important to
- Test the brakes \*
  - Notify the control tower
  - Closely monitor the instruments
254. The color of 100 LL fuel is
- Blue \*
  - Colorless or straw
  - Red
255. How are aviation fuels, which possess greater antiknock qualities than 100 octane, classified ?
- By performance numbers \*
  - By reference to normal heptane
  - According to the milliliters of lead
256. Why is ethylene dibromide added to aviation gasoline?
- To increase the antiknock rating of the fuel
  - To remove zinc silicate deposits from the spark plugs
  - To scavenge lead oxide from the cylinder combustion chambers \*
257. Both gasoline and kerosene have certain advantages for use as turbine fuel. Which statement is true in reference to the advantages of each ?
- Kerosene has a higher heat energy per unit weight than gasoline
  - Gasoline has a higher heat energy per unit volume than kerosene
  - Kerosene has a higher heat energy per unit volume than gasoline \*
258. What must accompany fuel vaporization ?
- A decrease in vapor pressure
  - A reduction in volume
  - An absorption of heat \*
259. Characteristics of detonation are
- Rapid rise in cylinder pressures, excessive cylinder heat temperature, and a decrease in engine power\*
  - Rapid rise in cylinder pressure, cylinder head temperature normal, and a decrease in engine power
  - Cylinder pressure remains the same, excessive cylinder head temperature, and a decrease in engine power
260. A fuel that vaporizes too readily may cause
- Hard starting
  - Vapor lock \*
  - Detonation
261. Jet fuel number identifiers are
- Performance numbers and are relative to the fuel's performance in the aircraft engine.
  - Type numbers and have no relation to the fuel's performance in the aircraft engine \*
  - Performance numbers to designate the volatility of the fuel
262. The main differences between grades 100 and 100LL fuel are
- Lead content and color \*
  - Volatility, lead content, and color
  - Volatility and lead content
263. Characteristics of aviation gasoline are
- High heat value, high volatility \*
  - High heat value, low volatility
  - Low heat value, low volatility
264. Tetraethyl lead is added to aviation gasoline to
- Retard the formation of corrosives
  - Improve the gasoline's performance in the engine\*
  - Dissolve the moisture in the gasoline
265. A fuel that does not vaporize readily enough can cause
- Detonation
  - Hard starting \*
  - Vapor lock
266. A primary reason why ordinary or otherwise non-approved cleaning compounds should not be used when washing aircraft is because their use can result in
- A general inability to remove compound residues
  - Hydrogen embrittlement in nonmetallic materials
  - Hydrogen embrittlement in metal structures \*
267. How may magnesium engine parts be cleaned ?
- Soak in a 20 percent caustic soda solution
  - Wash with a commercial solvent, decarbonize, and scrape or grit blast \*
  - Spray with MEK (methyl ethyl ketone)
268. When an anodized surface coating is damaged in service, it can be partially restored by
- Use of a suitable mild cleaner
  - Chemical surface treatment \*
  - Applying a thin coat of zinc chromate primer
269. Select the solvent recommended for wipedown of cleaned surfaces just before painting
- Aromatic naphtha
  - Dry cleaning solvent
  - Aliphatic naphtha \*
270. Nickel cadmium battery cases and drain surfaces which have been affected by electrolyte should be neutralized with a solution of
- Potassium hydroxide
  - Boric acid \*
  - Sodium bicarbonate



271. Which of the following are acceptable to use when utilizing chemical cleaning agents to clean aircraft ?
- Synthetic fiber wiping cloths when using a flammable agent
  - Cotton fiber wiping cloths when using a flammable agent
  - Atomizing spray equipment
- 2
  - 1
  - 2 and 3 \*
272. Select the solvent used to clean acrylics and rubber
- Aliphatic naphtha \*
  - Methyl ethyl ketone
  - Aromatic naphtha
273. Fayed surfaces cause concern in chemical cleaning because of the danger of
- Forming passive oxides
  - Corrosion by imbedded iron oxide
  - Entrapping corrosive materials \*
274. Caustic cleaning products used on aluminum structures have the effect of producing
- Passive oxidation
  - Corrosion \*
  - Improved corrosion resistances
275. Fretting corrosion is most likely to occur
- Only when two dissimilar metals are in contact
  - When two surfaces fit tightly together but can move relative to one another \*
  - When two surfaces fit loosely together and can move relative to one another
276. The rust of corrosion that occurs with most metals in the result of
- Electron flow in or between metals from cathodic to anodic areas
  - Blocking the flow of electrons in homogenous metals, or between dissimilar metals.
  - A tendency for them to return to their natural state\*
277. Which of the following are the desired effects of using Alodine on aluminum alloy ?
- A slightly rough surface
  - Relieved surface stresses
  - A smooth painting surface
  - Increased corrosion resistance
- 1 and 4 \*
  - 1, 2, and 4
  - 3 and 4
278. Which of the listed conditions is NOT one of the requirements for corrosion to occur ?
- The presence of an electrolyte
  - The presence of a passive oxide film \*
  - Electrical contact between an anodic area and a cathodic area
279. The lifting or flaking of the metal at the surface due to delamination of grain boundaries caused by the pressure of corrosion residual product buildup is called
- Brinelling
  - Exfoliation \*
  - Granulation
280. A non-electrolytic chemical treatment for aluminum alloys to increase corrosion resistance and paint bonding qualities is called
- Anodizing
  - Alodizing \*
  - Dichromating
281. Which of the following are acceptable to use in cleaning anodized surfaces ?
- Steel wool
  - Brass wire brush
  - Aluminum wool
  - Stainless steel wire brush
  - Fiber bristle brush
- 1, 3, & 5
  - 2 & 4
  - 3 & 5 \*
282. Intergranular corrosion in aluminum alloy parts
- Cannot always be detected by surface indications\*
  - May be detected by surface pitting, and white, powdery deposit formed on the surface of the metal
  - Commonly appears as threadlike filaments of corrosion products under a dense film of paint
283. What may be used to remove corrosion from highly stressed steel surfaces ?
- Steel wire brushes
  - Fine grit aluminum oxide \*
  - Medium grit carborundum paper
284. A primary cause of intergranular corrosion is
- Improper application of primer
  - Improper heat treatment \*
  - Dissimilar metal contact
285. Corrosion should be removed from magnesium parts with a
- Carborundum abrasive
  - Stiff, nonmetallic brush \*
  - Silicon carbide brush
286. Why is it important not to rotate the crankshaft after the corrosion preventive mixture has been put into the cylinders on engines prepared for storage ?
- Fuel may be drawn into one or more cylinders and dilute or wash off the corrosion preventive mixture
  - The seal of corrosion preventive mixture will be broken \*
  - Engine damage can occur from hydraulic lock
287. Why is a plastic surface flushed with fresh water before it is cleaned with soap and water ?
- To prevent crazing \*
  - To prevent scratching
  - To prevent discoloration
288. What should be done to prevent rapid deterioration when oil or grease come in contact with a tire ?
- Wipe the tire thoroughly with a dry cloth, and then rinse with clean water
  - Wipe the tire with a cloth dampened with aromatic naphtha and then wipe dry with a clean cloth
  - Wipe the tire with a dry cloth followed by a washdown and rinse with soap and water \*

289. Galvanic corrosion at the interface of a dissimilar metal part may best be prevented by
- Conducting frequent inspections and keeping all exposed areas of the part clean
  - Sealing exposed seam edges with a recommended sealing compound
  - Placing a nonporous dielectric material between the surfaces \*
290. Corrosion caused by galvanic action is the result of
- Excessive etching
  - Contact between two unlike metals \*
  - Excessive anodization
291. Which of these materials is the most anodic ?
- Cadmium
  - Magnesium
  - 7075-T6 aluminum alloy \*
292. The interior surface of sealed structural steel tubing would be best protected against corrosion by which of the following ?
- A coating of linseed oil \*
  - Evacuating moisture from the tubing before sealing
  - Charging the tubing with dry nitrogen prior to sealing
293. Which of these materials is the most cathodic ?
- 2024 aluminum alloy
  - Stainless steel \*
  - Zinc
294. Galvanic corrosion is likely to be most rapid and severe when
- The surface area of the anodic metal is smaller than the surface area of the cathodic metal \*
  - The surface area of the cathodic metal is smaller than surface area of the anodic metal
  - The surface areas of the anodic and cathodic metals are approximately the same
295. One way of obtaining increased resistance to stress corrosion cracking is by
- Relieving compressive stresses on the metal surface
  - Creating compressive stresses on the metal surface\*
  - Producing nonuniform deformation while cold working during the manufacturing process
296. i. In the corrosion process, it is the cathodic area of dissimilar cathodic material that corrodes  
ii. In the Galvanic or Electro-Chemical Series for metals, the most anodic metals are those that will give up electrons most easily  
Regarding the above statements
- Only No. 2 is true \*
  - Both No. 1 and No. 2 are true
  - Only No. 1 is true
297. Spilled mercury on aluminum
- May cause impaired corrosion resistance if left in prolonged contact
  - Causes rapid and severe corrosion that is very difficult to control \*
  - Increases susceptibility to hydrogen embrittlement
298. What power of 10 is equal to 1,000,000 ?
- 10 to the fourth power
  - 10 to the sixth power
  - 10 to the fifth power \*
299. Find the square root of 1,746
- 40.7742 \*
  - 41.7852
  - 41.7752
300. Find the square root of 3,722.1835
- 61.00971
  - 61.00
  - 61.0097 \*
301.  $8,019.0514 \times 1/81$  is equal to the square root of
- 9,108
  - 9,081
  - 9,801 \*
302. Find the cube of 64
- 4
  - 263,144
  - 192 \*
303. Find the value of 10 raised to the negative sixth power
- 0.000010
  - 0.0001 \*
  - 0.000001
304. What is the square root of 4 raised to the fifth power?
- 32 \*
  - 20
  - 64
305. The number  $3.47 \times 10$  to the negative fourth power is equal to
- .00347
  - 34,700.0
  - .000347 \*
306. Which alternative answer is equal to 16,300 ?
- $1.63 \times 10$  to the negative third power \*
  - $163 \times 10$  to the negative second power
  - $1.63 \times 10$  to the fourth power
307. Find the square root of 124.9924
- $1,118 \times 10$  to the negative second power
  - $111.8 \times 10$  to the third power
  - $.1118 \times 10$  to the negative second power \*
308. What is the square root of 16 raised to the fourth power?
- 256
  - 1,024
  - 4,096 \*
309. The result of 7 raised to the third power plus the square root of 39 is equal to
- 343.24 \*
  - 349.24
  - .34924

310. Find the square root of 1,824  
 a.  $42.708 \times 10$  to the negative second power  
 b.  $.42708 \times 10$  to the second power  
 c.  $.42708^*$
311. The total piston displacement of the specific engine is  
 a. The total volume of all the cylinders  
 b. The volume displaced by all the pistons during one revolution of the crankshaft \*  
 c. Dependent on the compression ratio
312. What size sheet of metal is required to fabricate a cylinder 20 inches long and 8 inches in diameter ?  
 a.  $20'' \times 24\text{-}9/64''$       b.  $20'' \times 25\text{-}5/32''$   
 c.  $20'' \times 25\text{-}9/64''^*$
313. What force is exerted on the piston in a hydraulic cylinder if the area of the piston is 1.2 square inches and the fluid pressure is 850 PSI ?  
 a. 850 pounds      b. 960 pounds  
 c. 1,020 pounds \*
314. A rectangular shaped fuel tank measures 60 inches in length, 30 inches in width, and 12 inches in depth. How many cubic feet are within the tank ?  
 a. 12.5 \*      b. 15.0  
 c. 21.0
315. Select the container size that will be equal in volume to 60 gallons of fuel. (7.5 gal = 1 cu ft)  
 a. 7.5 cubic feet      b. 8.5 cubic feet  
 c. 8.0 cubic feet \*
316. What is the piston displacement of a master cylinder with a 1.5 inch diameter bore and a piston stroke of 4 inches ?  
 a. 6.1541 cubic inches  
 b. 9.4247 cubic inches  
 c. 7.0686 cubic inches \*
317. How many gallons of fuel will be contained in a rectangular shaped tank which measures 2 feet in width, 3 feet in length, and 1 foot 8 inches in depth ? (7.5 gal = 1 cu ft)  
 a. 45      b. 75 \*  
 c. 66.6
318. A rectangular shaped fuel tank measures 27-1/2 inches in length, 3/4 foot in width, and 8-1/4 inches in depth. How many gallons will the tank contain ? (231 cu in = 1 gal)  
 a. 8.80 \*      b. 7.86  
 c. 9.80
319. A four cylinder aircraft engine has a cylinder bore of 3.78 inches and is 8.5 inches deep. With the piston on bottom center, the top of the approximate piston displacement of this engine ?  
 a. 235 cubic inches      b. 200 cubic inches \*  
 c. 360 cubic inches
320. A rectangular shaped fuel tank measures 37-1/2 inches in length, 14 inches in width, and 8-1/4 inches in depth. How many cubic inches are within the tank?  
 a. 4,331.25      b. 433.125 \*  
 c. 525
321. A six cylinder engine with a bore of 3.5 inches, & cylinder height of 7 inches and a stroke of 4.5 inches will have a total piston displacement of  
 a. 43.3 cubic inches      b. 259.77 cubic inches \*  
 c. 256.88 cubic inches
322. Select the fraction which is equal to .020  
 a. 2/5      b. 1/50 \*  
 c. 1/5
323. 1.21875 is equal to  
 a. 83/64      b. 39/32 \*  
 c. 19/16
324. If the volume of a cylinder with the piston at bottom center is 84 cubic inches and the piston displacement is 70 cubic inches, then the compression ratio is  
 a. 7 to 1      b. 1.2 to 1  
 c. 6 to 1 \*
325. Express 7/8 as a percent  
 a. 8.75 percent      b. .875 percent  
 c. 87.5 percent \*
326. What is the speed of a spur gear with 42 teeth driven by a pinion gear with 14 teeth turning 420 RPM ?  
 a. 140 RPM \*      b. 588 RPM  
 c. 160 RPM
327. An engine develops 108 horsepower at 87 percent power. What horsepower would be developed at 65 percent power ?  
 a. 64      b. 70  
 c. 80 \*
328. A certain aircraft bolt has an overall length of 1-1/2 inches, with a shank length of 1-3/16 inches, and a threaded portion length of 5/8 inch. What is the grip length ?  
 a. .8750 inch      b. .3125 inch \*  
 c. .5625 inch
329. Section the fractional equivalent for a 0.0625 inch thick sheet of aluminum  
 a. 3/64      b. 1/16 \*  
 c. 1/32
330. Express 5/8 as a percent  
 a. 6.25 percent      b. .625 percent  
 c. 62.5 percent \*
331. Selection the decimal which is most nearly equal to 77/64  
 a. 0.08311      b. 1.2031 \*  
 c. 0.8311

332. An airplane flying a distance of 875 miles used 70 gallons of gasoline. How many gallons will it need to travel 3,000 miles ?  
 a. 250                                          b. 144  
 c. 240 \*
333. What is the speed ratio of a gear with 36 teeth meshed to a gear with 20 teeth ?  
 a. 5 to 12                                        b. 6.6 to 12  
 c. 5 to 9 \*
334. A pinion gear with 14 teeth is driving a spur gear with 42 teeth at 140 RPM. Determine the speed of the pinion gear  
 a. 588 RPM                                      b. 420 RPM \*  
 c. 240 RPM
335. The parts department's profit is 12 percent on a new part. How much does the part cost if the selling price is \$145.60 ?  
 a. \$125.60                                      b. \$130 \*  
 c. \$128.12
336. If an engine is turning 1,965 rpm at 65 percent power, what is its maximum rpm ?  
 a. 3,023 \*                                        b. 2,653  
 c. 3,242
337. An engine of 98 horsepower maximum is running at 75 percent power. What is the horsepower being developed ?  
 a. 33.30                                          b. 73.50 \*  
 c. 87.00
338. A blueprint shows a hole of 0.17187 to be drilled, which fraction size drill bit is most nearly equal ?  
 a. 9/32                                              b. 11/32  
 c. 11/64 \*
339. Which decimal is most nearly equal to a bend radius of  $31/64$  ?  
 a. 0.2065                                        b. 0.3164  
 c. 0.4844 \*
340. Sixty five engines are what percent of 80 engines ?  
 a. 52 percent                                    b. 81 percent \*  
 c. 65 percent
341. The radius of a piece of round stock is  $7/32$ . Select the decimal which is most nearly equal to be diameter  
 a. 0.4375 \*                                      b. 0.3531  
 c. 0.2187
342. Maximum engine life is 900 hours. Recently, 27 engines were removed with an average life of 635.3 hours. What percent of the maximum engine life has been achieved ?  
 a. 71 percent                                    b. 72 percent  
 c. 73 percent \*
343. What is the ratio of 10 feet to 30 inches ?  
 a. 1:3  
 b. 4:1 \*  
 c. 3:1
344. Solve the equation  $4-3[-6(2+3)+4]=$   
 a. 82  
 b. -71 \*  
 c. -25
345. Solve the equation  $-6[-9(-8+4)-2(7+3)]=$   
 a. 216  
 b. -96 \*  
 c. -332
346. Solve the equation  $(-3+2)(-12-4)+(-4+6)x2$   
 a. 35  
 b. 28  
 c. 20 \*
347. Where is the record of compliance with Airworthiness Directives of manufacturer's service bulletins normally indicated ?  
 a. Aircraft maintenance records  
 b. FAA Form 337 \*  
 c. Flight manual
348. If work performed on an aircraft has been done satisfactorily, the signature of an authorized person on the maintenance records for maintenance or alterations performed constitutes  
 a. Approval for return to service only for the work performed \*  
 b. Only verification that the maintenance of alterations were performed referencing maintenance data  
 c. Approval of the aircraft for return to service
349. During an annual inspection, if a defect is found which makes the aircraft unairworthy, the person disapproving must  
 a. Provide a written notice of the defect to the owner\*  
 b. Submit a Malfunction or defect report  
 c. Void the Aircraft's Airworthiness Certificate
350. The transient performance characteristics of the control are conveniently obtained from curve of the  
 a. open-loop frequency response function \*  
 b. transfer functions of system  
 c. closed loop frequency response  
 d. all of the above  
 e. none of the above
351. Which is an appliance major repair ?  
 a. Repairs to a propeller governor or its control  
 b. Troubleshooting and repairing broken circuits in landing light circuits  
 c. Overhaul of a hydraulic pressure pump \*

352. Where should you find this entry ?  
 “Removed right wing from aircraft and removed skin from outer 6 feet. Repaired buckled spar 49 inches from tip in accordance with figure 8 in the manufacturer’s structural repair manual No.28-1.  
 a. FAA Form 337 \*  
 b. Aircraft minor repair and alteration record  
 c. Aircraft engine maintenance record
353. Which maintenance action is an airframe major repair  
 a. Changes to the wing or to fixed or movable control surfaces which affect flutter and vibration characteristics  
 b. Rewinding the field coil of an electrical accessory  
 c. The repair of portions of skin sheets by making additional seams \*
354. Which aircraft record entry is the best description of the replacement of several damaged heli coils in a casting ?  
 a. Eight 1/4 - 20 inch standard heli-coil inserts were repaired by replacing the damaged inserts with a lock type insert, after the tapped holes were checked for corrosion  
 b. Eight 1/4-20 inch standard heli-coils were replaced. The damaged inserts were extracted, the tapped holes gaged, then new inserts installed, and tangs removed \*  
 c. Eight 1/4 - 20 inch standard heli-coils were installed in place of damaged ones
355. Which maintenance record entry best describes the action taken for a control cable showing approximately 20 percent wear on several of the individual outer wires at a fairlead ?  
 a. Cable repositioned, worn area moved away from fairlead  
 b. Removed and replaced the control cable and rerigged the system \*  
 c. Wear within acceptable limits, repair not necessary
356. Which maintenance record entry best describes the action taken for a 125 inch deep dent in a straight section of 1/2 inch aluminum alloy tubing ?  
 a. Dented section removed and replaced with identical new tubing flared to 45°  
 b. Dent within acceptable limits, repair not necessary\*  
 c. Dented section removed and replaced with identical new tubing flared to 37°
357. Which aircraft record entry best describes a repair of a dent in a tubular steel structure dented at a cluster?  
 a. Welded a reinforcing plate over the dented area \*  
 b. Removed and replaced the damaged member  
 c. Filled the damaged area with a molten metal and dressed to the original contour
358. Who is responsible for making the entry in the maintenance records after an annual, 100 hour, or progressive inspection ?  
 a. The designee or inspector representing the FAA Administrator  
 b. The person approving or disapproving for return to service \*  
 c. The owner or operator of the aircraft
359. An aircraft owner was provided a list of discrepancies on an aircraft that was not approved for return to service after an annual inspection. Which of the following statements is /are true concerning who may correct the discrepancies ?  
 i. Only a mechanic with an inspection authorization  
 ii. An appropriately rated mechanic  
 iii. Any certificated repair station  
 a. 1 b. 2 & 3 \*  
 c. 2
360. When approving for return to service after maintenance or alteration, the approving person must enter in the maintenance record of the aircraft  
 a. A description (or reference to acceptable data) of work performed, date of completion, the name of the person performing the work (if someone else), signature, and certificate number  
 b. A description (or reference to acceptable data) of work performed, date of completion, the name of the person performing the work (if someone else), signature, and kind of certificate \*  
 c. The date the maintenance or alteration was begun, a description (or reference to acceptable data) or work performed, the name of the person performing the work (if someone else), signature, and certificate number
361. What is/are the appropriate action(s) concerning minor repairs performed on a certificate aircraft ?  
 i. FAA form 337’s must be completed  
 ii. Entries must be made in the aircraft’s maintenance record  
 iii. The owner of the aircraft must submit a record of all minor repairs to the FAA at least annually  
 a. 1 and 2 b. 2 and 3  
 c. 2 \*
362. After making a certain repair to an aircraft engine that is to be returned to service, an FAA Form 337 is prepared. How many copies are required and what is the disposition of the completed forms ?  
 a. Two one copy for the aircraft owner and one copy for the FAA \*  
 b. Three, one copy for the aircraft owner and one copy for the FAA, and one copy for the permanent records of the repairing agency or individual  
 c. Two one copy for the FAA and one copy for the permanent records of the repairing agency or individual

363. Who is responsible for upkeep of the required maintenance records for an aircraft ?
- The maintaining repair station or authorized inspector
  - The maintaining certificated mechanic
  - The aircraft owner \*
364. An aircraft was not approved for return to service after an annual inspection and the owner wanted to fly the aircraft to another maintenance base. Which statement is correct ?
- The owner must obtain a special flight permit \*
  - The aircraft becomes a restricted category type until it is approved for return to service
  - The aircraft may be flown without restriction up to 10 hours to reach another maintenance base
365. Each person performing an annual or 100 hour inspection shall use a checklist that contains at least those items in the appendix of
- 14 CFR part 43 \*      b. AC 43, 13-3
  - 14 CFR part 65
366. An FAA Form 337 is used to record and document
- Major repairs and major alterations \*
  - Major and minor repairs, and major and minor alterations
  - Preventive and routine maintenance
367. After a mechanic holding an airframe and powerplant rating completes a 100 hour inspection, what action is required before the aircraft is returned to service ?
- An operational check of all systems
  - A mechanic with an inspection authorization must approve the inspection
  - Make the proper entries in the aircraft's maintenance record \*
368. Which of the following may a certificated airframe and powerplant mechanic perform on aircraft and approve for return to service ?
- A 100 hour inspection
  - An annual inspection, under specified circumstances
  - A progressive inspection, under specified circumstances
- 1, 2 \*      b. 1, 2, 3
  - 1, 3
369. The force that can be produced by an actuating cylinder whose piston has a cross sectional area of 3 square inches operating in a 1,000 -PSI hydraulic system is most nearly
- 1,500 pounds      b. 3,000 pounds \*
  - 1,000 pounds
370. The boiling point of a given liquid varies
- Directly with pressure \*
  - Inversely with pressures
  - Directly with volume
371. Which of the following is NOT considered a method of heat transfer ?
- Diffusion \*      b. Convection
  - Conduction
372. An engine that weighs 350 pounds is removed from an aircraft by means of a mobile hoist. The engine is raised 3 feet above its attachment mount, and the entire assembly is then moved forward 12 feet. A constant force of 70 pounds is required to move the loaded hoist. What is the total work input required to move the hoist ?
- 1,890 foot pounds      b. 840 foot pounds \*
  - 1,050 foot pounds
373. Which condition is the actual amount of water vapor in a mixture of air and water ?
- Absolute humidity \*      b. Relative humidity
  - Dewpoint
374. Under which conditions will the rate of flow of a liquid through a metering orifice (or jet) be the greatest (all other factors being equal) ?
- Unmetered pressure, 17 PSI, [new line] metered pressure, 5 PSI, [new line] atmospheric pressure, 14.7 PSI
  - Unmetered pressure, 23 PSI, [new line] metered pressure 12 PSI, [new line] atmospheric pressure, 14.3 PSI \*
  - Unmetered pressure, 18 PSI, [new line] metered pressure, 17.5 PSI, [new line] atmospheric pressure, 14.5 PSI
375. Which will weigh the least ?
- 50 parts of dry air and 50 parts of water vapor
  - 35 parts of dry air and 65 parts of water vapor
  - 98 parts of dry air and 2 parts of water vapor \*
376. Which is the ratio of the water vapor actually present in the atmosphere to the amount that would be present if the air were saturated at the prevailing temperature and pressure ?
- Absolute humidity      b. Relative humidity \*
  - Dewpoint
377. The speed of sound in the atmosphere
- Varies according to the frequency of the sound
  - Changes with a change in temperature \*
  - Changes with a change in pressure
378. If the volume of a confined gas is doubled (without the addition of more gas), the pressure will (assume the temperature remains constant)
- Be reduced to one half its original value \*
  - Increase in direct proportion to the volume increase
  - Remain the same
379. If the temperature of a confined liquid is held constant and its pressure is tripled, the volume will
- Be reduced to one third its original volume
  - Triple      c. Remain the same \*

380. How much work input is required to lower (not drop) a 120 pound weight from the top of a 3 foot table to the floor ?  
 a. 40 foot pounds      b. 360 foot pounds \*  
 c. 120 pounds of force
381. Which atmospheric conditions will cause the true landing speed of an aircraft to be the greatest ?  
 a. Low temperature with low humidity \*  
 b. High temperature with low humidity  
 c. High temperature with high humidity
382. If the fluid pressure is 800 PSI in a 1/2 inch line supplying an actuating cylinder with a piston area of 10 square inches, the force exerted on the piston will be  
 a. 800 pounds      b. 8,000 pounds \*  
 c. 4,000 pounds
383. How many, if any, factors are necessary to determine power ?  
 i. Force exerted  
 ii. Distance the force moves  
 iii. Time required to do the work  
 a. One      b. Two  
 c. Three \*
384. What force must be applied to roll a 120 pound barrel up an inclined plane 9 feet long to a height of 3 feet (disregard friction) ?  
 L 'divided by' I = R 'divided by' E  
 L = Length of ramp, measured along the slope  
 I = Height of ramp  
 R = Weight of object to be raised or lowered  
 E = Force required to raise or lower object  
 a. 40 pounds \*      b. 360 pounds  
 c. 120 pounds
385. Which statement concerning heat and/or temperature is true ?  
 a. Temperature is a measure of the kinetic energy of the molecules of any substance \*  
 b. There is an inverse relationship between temperature and heat  
 c. Temperature is a measure of the potential energy of the molecules of any substance
386. What is absolute humidity ?  
 a. The actual amount of the water vapor in a mixture of air and water \*  
 b. The ratio of the water vapor actually present in the atmosphere to the amount that would be present if the air were saturated at the prevailing temperature and pressures  
 c. The temperature to which humid air must be cooled at constant pressure to become saturated
387. The temperature to which humid air must be cooled at constant pressure to become saturated is called  
 a. Dewpoint \*      b. Absolute humidity  
 c. Relative humidity
388. If both the volume and the absolute temperature of a confined gas are doubled, the pressure will  
 a. Not change      b. Be halved  
 c. Become four times as great \*
389. If all, or a significant part of a stall strip is missing on an airplane wing, a likely result will be  
 a. Decreased lift in the area of installation at high angles of attack  
 b. Asymmetrical lateral control at low angles of attack  
 c. Asymmetrical lateral control at or near stall angles of attack \*
390. An airplane wing is designed to produce lift resulting from  
 a. Positive air pressure below the wing's surface and negative air pressures above the wing's surface along with the downward deflection of air \*  
 b. Positive air pressure below and above the wing's surface along with the downward deflection of air  
 c. Negative air pressure below the wing's surface and positive air pressure above the wing's surface along with the downward deflection of air
391. The purpose of aircraft wing dihedral is to  
 a. Increase lateral stability \*  
 b. Increase longitudinal stability  
 c. Increase lift coefficient of the wing
392. Aspect ratio of a wing is defined as the ratio of the  
 a. Wingspan to the mean chord \*  
 b. Square of the chord to the wingspan  
 c. Wingspan to the wing root
393. A wing with a very high aspect ratio (in comparison with a low aspect ratio wing) will have  
 a. A low stall speed  
 b. Increased drag at high angles of attack \*  
 c. Poor control qualities at low airspeeds
394. The desired effect of using winglets on an aircraft's wingtips is to  
 a. Optimize wing dihedral and improve lateral stability  
 b. Reduce the aspect ratio  
 c. Increase the lift to drag ratio \*
395. Airworthiness Directives are issued primarily to  
 a. Present recommended maintenance procedures for correcting potentially hazardous defects  
 b. Provide information about malfunction or defect trends  
 c. Correct an unsafe condition \*
396. i. A supplemental type certificate may be issued to more than one applicant for the same design change, providing each applicant shows compliance with the applicable airworthiness requirement  
 ii. An installation of an item manufactured in accordance with the Technical Standard order system requires no further approval for installation in a particular aircraft  
 Regarding the above statements  
 a. Neither No. 1 nor No. 2 is true  
 b. Only No. 1 is true \*  
 c. Both No. 1 and No. 2 are true

397. Primary responsibility for compliance with Airworthiness Directives lies with the
- Certificated mechanic holding an Inspection Authorization who conducts appropriate inspections
  - Aircraft owner or operator \*
  - Certificated mechanic who maintains the aircraft
398. An aircraft type certificate data sheet contains
- Control surface adjustment points
  - Location of the datum \*
  - Maximum fuel grade to be used
399. Suitability for use of a specific propeller with a particular engine airplane combination can be determined by reference to what informational source
- Propeller specifications or propeller type certificate data sheet
  - Aircraft specifications or aircraft type certificate data sheet \*
  - Alphabetical index of current propeller type certificate data sheets, specifications, and listings
400. When an airworthy (at the time of sale) aircraft is sold, the Airworthiness Certificate
- Is voided and a new certificate is issued upon application by the new owner
  - Becomes invalid until the aircraft is reinspected and approved for return to service
  - Is transferred with the aircraft \*
401. The issuance of an Airworthiness certificate is governed by
- 14 CFR Part 21\*      b. 14 CFR Part 23
  - 14 CFR Part 39
402. Specifications pertaining to an aircraft, of which a limited number were manufactured under a type certificate and for which there is no current aircraft specification, can be found in the
- Summary of discontinued aircraft specifications
  - FAA statistical handbook of Civil Aircraft Specifications
  - Aircraft Listing \*
403. Where are technical descriptions of certificated propellers found ?
- Aircraft Specifications
  - Applicable Airworthiness Directives
  - Propeller type certificate data sheets \*
404. What information is generally contained in Aircraft specifications or type certificate data sheets ?
- Useful load of aircraft
  - Control surface movements \*
  - Empty weight of the aircraft
405. Placards required on an aircraft are specified in
- The federal aviation regulations under which the aircraft was type certificated
  - AC 43.13-1B
  - Aircraft specifications or type certificate data sheets \*
406. Technical information about older aircraft models, of which no more than 50 remain in service, can be found in the
- Aircraft listing \*
  - Summary of deleted and discontinued aircraft specifications
  - Index of antique aircraft
407. i. The Federal aviation regulations require approval after compliance with the data of a supplemental type certificate
- ii. An installation of an item manufactured in accordance with the technical standard order system requires no further approval for installation in a particular aircraft
- Only No. 2 is true
  - Neither No. 1 nor No. 2 is true
  - Only No. 1 is true \*
408. Which regulation provides information regarding instrument range markings for an airplane certificated in the normal category ?
- 14 CFR Part 23 \*      b. 14 CFR Part 25
  - 14 CFR Part 21
409. i. Propellers are NOT included in the Airworthiness Directive system
- ii. A certificated powerplant mechanic may make a minor repair on an aluminum propeller and approve for return to service
- Regarding the above statements
- Both No. 1 and No. 2 are true
  - Neither No. 1 nor No. 2 is true
  - Only No. 2 is true \*
410. An aircraft mechanic is privileged to perform major alterations on U.S certificate aircraft; however, the work must be done in accordance with FAA approved technical data before the aircraft can be returned to service. Which is NOT approved data ?
- AC 43.12-2A
  - Airworthiness Directives
  - Supplemental type certificates \*
411. What is the maintenance recording responsibility of the person who complies with an Airworthiness Directive ?
- Advise the FAA district office of the work performed, by submitting an FAA form 337
  - Advise the aircraft owner / operator of the work performed
  - Make an entry in the maintenance record of that equipment \*
412. When an automatic control system is..., the output variable overshoots its desired steady-state condition and a transient oscillation occurs
- underdamped \*
  - over damped
  - critically damped
  - damped
  - without damping



413. The air transport association of America (ATA) specification No. 100
- Establishes a standard for the presentation of technical data in maintenance manuals
  - Divides the aircraft into numbered systems and subsystems in order to simplify locating maintenance instructions
- Regarding the above statements
- Only No. 1 is true
  - Both No. 1 and No. 2 are true \*
  - Neither No 1 nor No. 2 is true
414. General Aviation Airworthiness Alerts
- Provide temporary emergency procedures until Airworthiness directives can be issued
  - Provide information about aircraft problems and suggested corrective actions \*
  - Provide mandatory procedures to prevent or correct serious aircraft problems
415. The following is a table of airspeed limits as given in an FAA issued aircraft specification
- Normal operating speed 260 knots  
 Never operating speed 293 knots  
 Maximum landing gear operation speed 174 knots  
 Maximum flap extended speed 139 knots  
 The high ends of the white arc on the airspeed instrument would be at
- 139 knots \*
  - 293 knots
  - 260 knots
416. A complete detailed inspection and adjustment of the valve mechanism will be made at the first 25 hours after the engine has been placed in service. Subsequent inspections of the valve mechanism will be made each second 50 hour period
- From the above statement, at what intervals will valve mechanism inspections be performed ?
- 100 hours \*
  - 50 hours
  - 125 hours
417. Check thrust bearing nuts for tightness on new or newly overhauled engines at the first 50 hour inspection following installation. Subsequent inspections on thrust bearing nuts will be made at each third 50 hour inspection.
- From the above statement, at what intervals should you check the thrust bearing nut for tightness ?
- 250 hours
  - 200 hours
  - 150 hours \*
418. Certificated mechanics with a powerplant rating may perform
- Any inspection required by the Federal Aviation Regulations on a powerplant or propeller or any component thereof, and may release the same to service.
  - 100 hour and/or annual inspections required by the Federal Aviation Regulations on powerplant, propellers or any components thereof, and may release the same to service
  - 100 hour inspections required by the Federal Aviation Regulations on a powerplant, propeller, or any component thereof, any may release the same to service \*
419. A repair, as performed on an airframe, shall mean
- Simple or minor preservation operations and the replacement of small standard parts not involving complex assembly operations
  - The upkeep and preservation of the airframe including the component parts thereof
  - The restoration of the airframe to the condition for safe operation after damage or deterioration \*
420. The replacement of fabric on fabric covered parts such as wings, fuselages, stabilizers, or control surfaces is considered to be a
- Major repair even though no other alteration or repair is performed
  - Minor repair unless the new cover is different in any way from the original cover
  - Minor repair unless the underlying structure is altered or repaired \*
421. Which is classified as a major repair ?
- The splicing of skin sheets \*
  - Any repair of damaged stressed metal skin
  - Installation of new engine mounts obtained from the aircraft manufacturer
422. The 100 hour inspection required by Federal Aviation Regulations for certain aircraft being operated for hire may be performed by
- Persons working under the supervision of an appropriately rated mechanic, but the aircraft must be approved by the mechanic for return to service
  - Appropriately rated mechanics only if they have an inspection authorization
  - Appropriately rated mechanics and approved by them for return to service \*
423. A person working under the supervision of a certificated mechanic with an airframe and powerplant rating is not authorized to perform
- Repair of a wing brace strut by welding
  - A 100 hour inspection
  - Repair of an engine mount by riveting \*
424. Certificated mechanics, under their general certificate privileges, may
- Perform minor repairs to instruments
  - Perform 100 hour inspection of instruments \*
  - Perform minor alterations to instrument
425. An Airworthiness Directive requires that a propeller be altered. Certificated mechanics could
- Perform and approve the work for return to service if it is a minor alteration
  - Not perform the work because it is an alteration \*
  - Not perform the work because they are not allowed to perform and approve for return to service, repairs or alterations to propellers

426. The replacement of a damaged vertical stabilizer with a new identical stabilizer purchased from the aircraft manufacturer is considered a
- Minor repair
  - Major repair
  - Minor alteration \*
427. FAA certificated mechanics may
- Approve for return to service a major repair for which they are rated
  - Supervise and approve a 100 hour inspection \*
  - Approve for return to service a minor alteration they have performed appropriate to the rating (s) they hold
428. A certificated mechanic with a powerplant rating may perform the
- 100 hour inspection required by the Federal Aviation Regulations on an airframe, powerplant, or any other component thereof and approve and return the same to service
  - 100 hour inspection required by the Federal Aviation Regulations on a powerplant or any component thereof and approve and return the same to service \*
  - Annual inspection required by the Federal Aviation Regulations on a powerplant or any component thereof and approve and return the same to service
429. What part of the Federal Aviation Regulations prescribes the requirements for issuing mechanic certificates and associated ratings and the general operating rules for the holders of these certificates and ratings ?
- 14 CFR Part 91
  - 14 CFR Part 43 \*
  - 14 CFR Part 65
430. A certificated mechanic shall not exercise the privileges of the certificate and rating unless, within the preceding 24 months, the Administrator has found that the certificate holder is able to do the work or the certificate holder has
- Served as a mechanic under the certificate and rating for at least 12 months
  - Served as a mechanic under the certificate and rating for at least 18 months
  - Served as a mechanic under the certificate and rating for at least 6 months \*
431. i. Certificated mechanics with an airframe rating may perform a minor repair to an airspeed indicator providing they have the necessary equipment available
- Certificated mechanics with a powerplant rating may perform a major repair to a propeller providing they have the necessary equipment available
- Regarding the above statements
- Only No. 1 is true
  - Neither No. 1 nor No. 2 is true \*
  - Only No. 2 is true
432. Who is responsible for determining that materials used in aircraft maintenance and repair are of the proper type and conform to the appropriate standard?
- The owner of the aircraft
  - The installing person or agency \*
  - The manufacturer of the aircraft
433. Which of these publications contains standards for protrusion of bolts, studs, and screws through self locking nuts ?
- Aircraft Specifications or Type certificate data sheets
  - AC 43.13-1B \*
  - AC 43.13-2
434. The replacement of a damaged engine mount with a new identical engine mount purchased from the aircraft manufacturer is considered a
- Major repair
  - Minor repair \*
  - Major or minor repair, depending upon the complexity of the installation
435. Who has the authority to approve for return to service a propeller after a 100 hour inspection ?
- A mechanic with a powerplant rating
  - Any certificated repairman
  - A non certificated mechanic working under the supervision of a certificated mechanic with airframe and powerplant ratings
- 1 and 3
  - 1 \*
  - 2
436. Instrument repairs may be performed
- By the instrument manufacturer only
  - By an FAA approved instrument repair station \*
  - On airframe instruments by mechanics with an airframe rating
437. Which statement about wood decay is correct?
- Decay that occurs before the wood is seasoned does not affect the strength of the finished piece.
  - A limited amount of certain kinds of decay is acceptable in aircraft woods since decay affects the binding between the fibers and not the fibers themselves.
  - Decay is not acceptable in any form or amount \*.
438. Compression failures in wood aircraft structures are characterized by buckling of the fibers that appear as streaks on the surface
- at right angles to the growth rings.
  - parallel to the grain.
  - at right angles to the grain.\*
439. Glue deterioration in wood aircraft structure is indicated
- when a joint has separated and the glue surface shows only the imprint of the wood with no wood fibers clinging to the glue.
  - when a joint has separated and the glue surface shows pieces of wood and/or wood fibers clinging to the glue.\*
  - by any joint separation.

440. When patching a plywood skin, abrupt changes in cross sectional areas which will develop dangerous stress concentration should be avoided by using
- circular or elliptical patches.\*
  - square patches.
  - doublers with any desired shaped patches.
441. Laminated wood is sometimes used in the construction of highly stressed aircraft components. This wood can be identified by its
- parallel grain construction.\*
  - similarity to standard plywood construction.
  - perpendicular grain construction.
442. The cantilever wing uses
- external struts or wire bracing.\*
  - no external bracing.
  - the skin to carry most of the load to the wing butt.
443. Pin knot clusters are permitted in wood aircraft structure provided
- they produce a small effect on grain direction.\*
  - they have no mineral streaks.
  - no pitch pockets are within 12 inches.
444. Following is the property of the system which oppose a change in the output variable
- load
  - power element
  - resistance
  - damping \*
  - all of the above
445. A faint line running across the grain of a wood spar generally indicates
- compression failure.\*
  - shear failure.
  - decay.
446. In cases of elongated boltholes in a wood spar or cracks in the vicinity of boltholes,
- it is permissible to ream the hole, plug with hardwood, and redrill.
  - the spar may be reinforced by using hardwood reinforcing plates.
  - a new section of spar should be spliced in or the spar replaced entirely.\*
447. Where is information found concerning acceptable species substitutions for wood materials used in aircraft repair?
- Aircraft Specifications or Type Certificate Data Sheets.
  - Technical Standard Orders.
  - AC 43.13-1B.\*
448. The strength of a well designed and properly prepared wood splice joint is provided by the
- bearing surface of the wood fibers.
  - glue.\*
  - reinforcement plates.
449. The I beam wooden spar is routed to
- increase strength.
  - obtain uniform strength.
  - reduce weight.\*
450. When testing the strength of Grade A cotton fabric covering an aircraft that requires only intermediate grade, the minimum acceptable strength the fabric must have is
- 70 percent of its original strength.
  - 70 percent of the original strength for intermediate fabric.\*
  - 56 pounds per inch warp and fill.
451. (1) Machine sewn seams in aircraft covering fabrics may be of the folded fell or French fell types (2) A plain lapped seam is never permissible. Regarding the above statements,
- both No. 1 and No. 2 are true.
  - only No. 1 is true.\*
  - only No. 2 is true.
452. Fabric rejuvenator
- restores the condition of dope coatings.
  - restores fabric strength and tautness to at least the minimum acceptable level.\*
  - penetrates the fabric and restores fungicidal resistance.
453. The strength classification of fabrics used in aircraft covering is based on
- bearing strength.
  - shear strength.
  - tensile strength.\*
454. The best method of repair for a fabric covered surface which has an L shaped tear, each leg of which is approximately 14 inches long, is to
- re-cover the entire bay in which the tear is located.
  - sew from the end of each leg to the center of the tear with a baseball stitch and then dope on a patch.
  - sew with a baseball stitch from the center of the tear out toward the extremity of each leg and then dope on a patch.\*
455. Moisture, mildew, chemicals, and acids have no effect on
- glass fabric.\*
  - linen fabric.
  - dacron fabric.
456. Finishing tape (surface tape) is used for what purpose?
- To help prevent 'ripple formation' in covering fabric.
  - To provide additional anti-tear resistance under reinforcement tape.
  - To provide additional wear resistance over the edges of fabric forming structures.\*

457. The overshoot and the setting time are maximum with
- underdamped system \*
  - overdamped system
  - critically damped system
  - damped system
  - non damped system
458. The determining factor(s) for the selection of the correct weight of textile fabric to be used in covering any type of aircraft is the
- maximum wing loading.
  - speed of the aircraft.
  - speed of the aircraft and the maximum wing loading\*.
459. When and how is finishing tape applied on a fabric covered aircraft?
- Sewed or laced on before dope is applied.
  - Doped on immediately prior to the finish coat.
  - Doped on after the first or second coat of dope.\*
460. When dope-proofing the parts of the aircraft structure that come in contact with doped fabric, which of the following provide an acceptable protective coating ?
- Aluminum foil.
  - Resin impregnated cloth tape.
  - Any one-part type metal primer.
  - Cellulose tape.
- 1 and 2.
  - 1 and 4.\*
  - 3 and 4.
461. Which defect in aircraft finishes may be caused by adverse humidity, drafts, or sudden changes in temperature?
- Orange peel.
  - Blushing.
  - Pinholes.\*
462. If registration numbers are to be applied to an aircraft with a letter height of 12 inches, what is the minimum space required for the registration mark N1683C?  
Note:  
 $\frac{2}{3} \times \text{height} = \text{character width.}$   
 $\frac{1}{6} \times \text{height} = \text{width for 1.}$   
 $\frac{1}{4} \times \frac{2}{3} \text{ height} = \text{spacing.}$   
 $\frac{1}{6} \times \text{height} = \text{stroke or line width.}$
- 52 inches.\*
  - 48 inches.
  - 57 inches.
463. If masking tape is applied to an aircraft such as for trim spraying, and is left on for several days and/or exposed to heat, it is likely that the tape will
- not seal out the finishing material if the delay or heating occurs before spraying.
  - be weakened in its ability to adhere to the surface.
  - cure to the finish and be very difficult to remove.\*
464. What is used to slow the drying time of some finishes and to prevent blush?
- Reducer.
  - Retarder.\*
  - Rejuvenator.
465. Which type of coating typically includes phosphoric acid as one of its components at the time of application?
- Wash primer.\*
  - Epoxy primer.
  - Zinc chromate primer.
466. Which properly applied finish topcoat is the most durable and chemical resistant?
- Synthetic enamel.
  - Acrylic lacquer.
  - Polyurethane.\*
467. Aluminum-pigment in dope is used primarily to
- provide a silver color.
  - aid in sealing out moisture from the fabric.
  - exclude sunlight from the fabric.\*
468. A correct use for acetone is to
- thin zinc chromate primer.
  - remove grease from fabric.\*
  - thin dope.
469. Which of the following is a hazard associated with sanding on fabric covered surfaces during the finishing process?
- Overheating of the fabric/finish, especially with the use of power tools.
  - Static electricity buildup.\*
  - Embedding of particles in the finish.
470. What is likely to occur if unhydrated wash primer is applied to unpainted aluminum and then about 30 to 40 minutes later a finish topcoat, when the humidity is low?
- Corrosion.\*
  - A glossy, blush-free finish.
  - A dull finish due to the topcoat 'sinking in' to primer that is still too soft.
471. Fungicidal dopes are used in aircraft finishing as the
- first coat to prevent fabric rotting and are applied thin enough to saturate the fabric.
  - first, full-bodied, brushed-on coat to prevent fungus damage.\*
  - final, full-bodied, brushed-on coat to reduce blushing.
472. Before spraying any finishing materials on unpainted clean aluminum,
- wipe the surface with avgas or kerosene.
  - remove any conversion coating film.
  - avoid touching the surface with bare hands.\*
473. What is the usual cause of runs and sags in aircraft finishes?
- Too much material applied in one coat.\*
  - Material is being applied too fast.
  - Low atmospheric humidity.

474. Which statement is true regarding paint system compatibility?
- Old type zinc chromate primer may not be used directly for touchup of bare metal surfaces.
  - Acrylic nitrocellulose lacquers may be used over old nitrocellulose finishes.
  - Old wash primer coats may be overcoated directly with epoxy finishes.\*
475. What is likely to occur if hydrated wash primer is applied to unpainted aluminum and then about 30 to 40 minutes later a finish topcoat, when the humidity is low?
- Corrosion.
  - A glossy, blush-free finish.\*
  - A dull finish due to the topcoat 'sinking in' to primer that is still too soft.
476. What reference tool is used to determine how the fiber is to be oriented for a particular ply of fabric?
- Fill clock (or compass).
  - Bias clock (or compass).
  - Warp clock (or compass).\*
477. The primary alloying agent of 2024-T36 is indicated by the number
- 2.\*
  - 20.
  - 24.
478. Which rivets should be selected to join two sheets of .032-inch aluminum?
- MS20425D-4-3.
  - MS20470AD-4-4.\*
  - MS20455DD-5-3.
479. When an MS20470D rivet is installed, its full shear strength is obtained
- only after a period of age hardening.\*
  - by the cold working of the rivet metal in forming a shop head.
  - by heat treating just prior to being driven.
480. Which of the following need not be considered when determining minimum rivet spacing?
- Rivet diameter.
  - Rivet length.
  - Type of material being riveted.\*
481. What is the purpose of refrigerating 2017 and 2024 aluminum alloy rivets after heat treatment?
- To accelerate age hardening.
  - To relieve internal stresses.
  - To retard age hardening.\*
482. Under certain conditions, type A rivets are not used because of their
- low strength characteristics.\*
  - high alloy content.
  - tendency toward embrittlement when subjected to vibration.
483. A rivet set used to drive MS20470 rivets should
- have the same radius as the rivet head.
  - have a slightly greater radius than the rivet head.\*
  - be nearly flat on the end, with a slight radius on the edge to prevent damage to the sheet being riveted.
484. What is indicated by a black 'smoky' residue streaming back from some of the rivets on an aircraft?
- The rivets were excessively work hardened during installation.
  - Exfoliation corrosion is occurring inside the structure.
  - Fretting corrosion is occurring between the rivets and the skin.\*
485. The dimensions of an MS20430AD-4-8 rivet are
- 1/8 inch in diameter and 1/4 inch long.\*
  - 1/8 inch in diameter and 1/2 inch long.
  - 4/16 inch in diameter and 8/32 inch long.
486. Which part of the 2017-T36 aluminum alloy designation indicates the primary alloying agent used in its manufacture?
- 2.\*
  - 17.
  - 20.
487. A sheet metal repair is to be made using two pieces of 0.040-inch aluminum riveted together. All rivet holes are drilled for 3/32-inch rivets. The length of the rivets to be used will be
- 1/8 inch.
  - 1/4 inch.\*
  - 5/16 inch.
488. Most rivets used in aircraft construction have
- dimples.
  - smooth heads without markings.
  - a raised dot.\*
489. Indicates a countersunk rivet which has
- a shank length of 5/16 inch (excluding head).
  - a shank length of 5/32 inch (excluding head).
  - an overall length of 5/16 inch.\*
490. Which rivet may be used as received without further treatment?
- 2024-T4.
  - 2117-T3.\*
  - 2017-T3.
491. Which is correct concerning the use of a file?
- Apply pressure on the forward stroke, only, except when filing very soft metals such as lead or aluminum.\*
  - A smoother finish can be obtained by using a double cut file than by using a single cut file.
  - The terms 'double cut' and 'second cut' have the same meaning in reference to files.
492. Heat treated rivets in the D and DD series that are not driven within the prescribed time after heat treatment or removal from refrigeration
- must be reheat treated before use.\*
  - must be discarded.
  - may be returned to refrigeration and used later without reheat treatment.

493. A factor which determines the minimum space between rivets is the
- length of the rivets being used.
  - diameter of the rivets being used.\*
  - thickness of the material being riveted.
494. A potted compound repair on honeycomb can usually be made on damages less than
- 4 inches in diameter.
  - 2 inches in diameter.
  - 1 inch in diameter.\*
495. When repairing a small hole on a metal stressed skin, the major consideration in the design of the patch should be
- the shear strength of the riveted joint.\*
  - to use rivet spacing similar to a seam in the skin.
  - that the bond between the patch and the skin is sufficient to prevent dissimilar metal corrosion.
496. Which procedure is correct when using a reamer to finish a drilled hole to the correct size?
- Turn the reamer in the cutting direction when enlarging the hole and in the opposite direction to remove from the hole.
  - Turn the reamer only in the cutting direction.\*
  - Apply considerable pressure on the reamer when starting the cut and reduce the pressure when finishing the cut.
497. Repairs or splices involving stringers on the lower surface of stressed skin metal wings are usually
- not permitted.
  - permitted only if the damage does not exceed 6 inches in any direction.
  - permitted but are normally more critical in reference to strength in tension than similar repairs to the upper surface.\*
498. When straightening members made of 2024-T4, you should
- straighten cold and reinforce.
  - straighten cold and anneal to remove stress.\*
  - apply heat to the inside of the bend.
499. Clad aluminum alloys are used in aircraft because they
- can be heat treated much easier than the other forms of aluminum.
  - are less subject to corrosion than uncoated aluminum alloys.\*
  - are stronger than unclad aluminum alloys.
500. The identifying marks on the heads of aluminum alloy rivets indicate the
- degree of dimensional and process control observed during manufacture.
  - head shape, shank size, material used, and specifications adhered to during manufacture.\*
  - specific alloy used in the manufacture of the rivets.
501. Aircraft structural units, such as spars, engine supports, etc., which have been built up from sheet metal, are normally
- repairable, using approved methods.\*
  - repairable, except when subjected to compressive loads.
  - not repairable, but must be replaced when damaged or deteriorated.
502. A sheet metal repair is to be made using two pieces of 0.0625-inch aluminum riveted together. All rivet holes are drilled for 1/8-inch rivets. The length of the rivets to be used will be
- 5/32 inch.
  - 3/16 inch.
  - 5/16 inch.\*
503. What should be the included angle of a twist drill for hard metal?
- 118°.\*
  - 100°.
  - 90°.
504. When fabricating parts from Alclad 2024-T3 aluminum sheet stock,
- bends should be made with a small radius to develop maximum strength.
  - all bends must be 90° to the grain.
  - all scratches, kinks, tool marks, nicks, etc., must be held to a minimum.\*
505. The monocoque fuselage relies largely on the strength of
- bulkheads and longerons.
  - longerons and formers.
  - skin or covering.\*
506. Which part(s) of a semi monocoque fuselage prevent (s) tension and compression from bending the fuselage?
- The fuselage covering.
  - Longerons and stringers.\*
  - Bulkheads and skin.
507. Rivet gauge, or transverse pitch is the distance between the
- centers of rivets in adjacent rows.\*
  - centers of adjacent rivets in the same row.
  - heads of rivets in the same row.
508. Rivet pitch is the distance between the
- centers of rivets in adjacent rows.
  - centers of adjacent rivets in the same row.\*
  - heads of rivets in the same row.
509. Which statement is true regarding a cantilever wing?
- It has nonadjustable lift struts.
  - No external bracing is needed.\*
  - It requires only one lift strut on each side.

510. When bending metal, the material on the outside of the curve stretches while the material on the inside of the curve compresses. That part of the material which is not affected by either stress is the
- mold line.
  - bend tangent line.
  - neutral line.\*
511. If it is necessary to compute a bend allowance problem and bend allowance tables are not available, the neutral axis of the bend can be
- represented by the actual length of the required material for the bend.
  - found by adding approximately one half of the stock thickness to the bend radius.\*
  - found by subtracting the stock thickness from the bend radius.
512. Unless otherwise specified, the radius of a bend is the
- inside radius of the metal being formed.\*
  - inside radius plus one half the thickness of the metal being formed.
  - radius of the neutral axis plus one half the thickness of the metal being formed.
513. The sharpest bend that can be placed in a piece of metal without critically weakening the part is called the
- bend allowance.
  - minimum radius of bend.\*
  - maximum radius of bend.
514. The most important factors needed to make a flat pattern layout are
- radius, thickness, and mold line.
  - radius, thickness, and degree of bend.\*
  - the lengths of the legs (flat sections).
515. A piece of sheet metal is bent to a certain radius. The curvature of the bend is referred to as the
- bend allowance.\*
  - neutral line.
  - bend radius.
516. When a piece of aluminum alloy is to be bent using a minimum radius for the type and thickness of material,
- the piece should be bent slowly to eliminate cracking.
  - the layout should be made so that the bend will be 90° to the grain of the sheet.\*
  - less pressure than usual should be applied with the movable (upper) clamping bar.
517. The purpose of a joggle is to
- allow clearance for a sheet or an extrusion.\*
  - increase obstruction for a sheet or an extrusion.
  - decrease the weight of the part and still retain the necessary strength.
518. A piece of flat stock that is to be bent to a closed angle of 15° must be bent through an angle of
- 165°.\*
  - 105°.
  - 90°.
519. The sight line on a sheet metal flat layout to be bent in a cornice or box brake is measured and marked
- one-half radius from either bend tangent line.
  - one radius from either bend tangent line.
  - one radius from the bend tangent line that is placed under the brake.\*
520. On a sheet metal fitting layout with a single bend, allow for stretching by
- adding the setback to each leg.
  - subtracting the setback from one leg.
  - subtracting the setback from both legs.\*
521. The aluminum alloys used in aircraft construction are usually hardened by which method?
- Cold working.
  - Aging.
  - Heat treatment.\*
522. You can distinguish between aluminum and aluminum alloy by
- filing the metal.
  - testing with an acetic acid solution.
  - testing with a 10 percent solution of caustic soda \*
523. Which rivet is used for riveting nickel steel alloys?
- 2024 aluminum.
  - Mild steel.
  - Monel.\*
524. Mild steel rivets are used for riveting
- nickel steel parts.
  - magnesium parts.
  - steel parts.\*
525. DD rivet is heat treated before use to
- harden and increase strength.
  - relieve internal stresses.
  - soften to facilitate riveting.\*
526. When riveting dissimilar metals together, what precautions must be taken to prevent an electrolytic action?
- Treat the surfaces to be riveted together with a process called anodic treatment.
  - Place a protective separator between areas of potential electrical difference.\*
  - Avoid the use of dissimilar metals by redesigning the unit according to the recommendations outlined in AC 43.13-1A.
527. The length of a rivet to be used to join a sheet of .032-inch and .064-inch aluminum alloy should be equal to
- two times the rivet diameter plus .064 inch.
  - one and one half times the rivet diameter plus .096 inch.\*
  - three times the rivet diameter plus .096 inch.

528. What is generally the best procedure to use when removing a solid shank rivet?
- Drill through the manufactured head and shank with a shank size drill and remove the rivet with a punch.
  - Drill to the base of the manufactured rivet head with a drill one size smaller than the rivet shank and remove the rivet with a punch.
  - Drill through the manufactured head and shank with a drill one size smaller than the rivet and remove the rivet with a punch.\*
529. Joggles in removed rivet shanks would indicate partial
- bearing failure.
  - torsion failure.
  - shear failure.\*
530. The flat layout or blank length of a piece of metal from which a simple L shaped bracket 3 inches by 1 inch is to be bent depends upon the radius of the desired bend. The bracket which will require the greatest amount of material is one which has a bend radius of
- 1/8 inch.\*
  - 1/2 inch.
  - 1/4 inch.
531. Which rivet is used for riveting magnesium alloy structures?
- Mild steel.
  - 5056 aluminum.\*
  - Monel.
532. The length of rivet to be chosen when making a structural repair that involves the joining of 0.032-inch and 0.064-inch aluminum sheet, drilled with a No. 30 drill, is
- 7/16 inch.
  - 5/16 inch.\*
  - 1/4 inch.
533. If a streamline cover plate is to be hand formed using a form block, a piece of dead soft aluminum should first be placed over the hollow portion of the mold and securely fastened in place. The bumping operation should be
- distributed evenly over the face of the aluminum at all times rather than being started at the edges or center.
  - started by tapping the aluminum lightly around the edges and gradually working down into the center\*.
  - started by tapping the aluminum in the center until it touches the bottom of the mold and then working out in all directions.
534. What type loads cause the most rivet failures?
- Shear.\*
  - Bearing.
  - Head.
535. Superficial scars, scratches, surface abrasion, or rain erosion on fiberglass laminates can generally be repaired by applying
- a piece of resin impregnated glass fabric facing.
  - one or more coats of suitable resin (room temperature catalyzed. to the surface.\*
  - a sheet of polyethylene over the abraded surface and one or more coats of resin cured with infrared heat lamps.
536. Proper pre-preg composite lay-up curing is generally accomplished by
- applying external heat.
  - room temperature exposure.
  - adding a catalyst or curing agent to the resin.
  - applying pressure.
- 2 and 3.
  - 1 and 4.\*
  - 1, 3, and 4.
537. One method of inspecting a laminated fiberglass structure that has been subjected to damage is to
- strip the damaged area of all paint and shine a strong light through the structure.\*
  - use dye penetrant inspection procedures, exposing the entire damaged area to the penetrant solution.
  - use an eddy current probe on both sides of the damaged area.
538. When inspecting a composite panel using the ring test/tapping method, a dull thud may indicate
- less than full strength curing of the matrix.
  - separation of the laminates.\*
  - an area of too much matrix between fiber layers.
539. How many of the following are benefits of using microballoons when making repairs to laminated honeycomb panels?
- Greater concentrations of resin in edges and corners.
  - Improved strength to weight ratio.
  - Less density.
  - Lower stress concentrations.
- Two.
  - Three.\*
  - Four.
540. The length of time that a catalyzed resin will remain in a workable state is called the
- pot life.\*
  - shelf life.
  - service life.
541. A category of plastic material that is capable of softening or flowing when reheated is described as a
- thermoplastic.\*
  - thermocure.
  - thermoset.
542. One of the best ways to assure that a properly prepared batch of matrix resin has been achieved is to
- perform a chemical composition analysis.
  - have mixed enough for a test sample.\*
  - test the viscosity of the resin immediately after mixing.
543. Which is an identifying characteristic of acrylic plastics?
- Zinc chloride will have no effect.\*
  - Has a yellowish tint when viewed from the edge.
  - Acetone will soften plastic, but will not change its color.



544. When balsa wood is used to replace a damaged honeycomb core, the plug should be cut so that
- the grain is parallel to the skin.\*
  - it is about 1/8-inch undersize to allow sufficient bonding material to be applied.
  - the grain is perpendicular to the skin.
545. The classification for fiberglass reinforcement material that has high resistivity and is the most common is
- E.\*
  - S.
  - G
546. Composite fabric material is considered to be the strongest in what direction?
- Fill.\*
  - Warp.
  - Bias.
547. When repairing puncture type damage of a metal faced laminated honeycomb panel, the edges of the doubler should be tapered to
- two times the thickness of the metal.
  - 100 times the thickness of the metal.\*
  - whatever is desired for a neat, clean appearance.
548. The strength and stiffness of a properly constructed composite buildup depends primarily on
- a 60 percent matrix to 40 percent fiber ratio.
  - the orientation of the plies to the load direction.
  - the ability of the fibers to transfer stress to the matrix.\*
549. Which fiber to resin (percent) ratio for advanced composite wet lay-ups is generally considered the best for strength?
- 40:60.
  - 50:50.
  - 60:40.\*
550. What is one of the determining factors which permits machine countersinking when flush riveting?
- Thickness of the material and rivet diameter are the same.
  - Thickness of the material is less than the thickness of the rivet head.
  - Thickness of the material is greater than the thickness of the rivet head.\*
551. The classification for high tensile strength fiberglass used in aircraft structures is
- E.
  - S.\*
  - G
552. Threaded rivets (Rivnuts) are commonly used to
- join two or more pieces of sheet metal where shear strength is desired.
  - attach parts or components with screws to sheet metal.\*
  - join two or more pieces of sheet metal where bearing strength is desired.
553. A main difference between Lockbolt/ Huckbolt tension and shear fasteners (other than their application) is in the
- number of locking collar grooves.\*
  - shape of the head.
  - method of installation.
554. Alloy 2117 rivets are heat treated
- by the manufacturer and do not require heat treatment before being driven.\*
  - by the manufacturer but require reheat treatment before being driven.
  - to a temperature of 910 to 930 °F and quenched in cold water.
555. The general rule for finding the proper rivet diameter is
- three times the thickness of the materials to be joined.
  - two times the rivet length.
  - three times the thickness of the thickest sheet.\*
556. The shop head of a rivet should be
- one and one-half times the diameter of the rivet shank.\*
  - one-half times the diameter of the rivet shank.
  - one and one-half times the diameter of the manufactured head of the rivet.
557. One of the main advantages of Hi-Lok type fasteners over earlier generations is that
- they can be removed and reused again.
  - the squeezed on collar installation provides a more secure, tighter fit.
  - they can be installed with ordinary hand tools.\*
558. The markings on the head of a Dzus fastener identify the
- body diameter, type of head, and length of the fastener.\*
  - body type, head diameter, and type of material.
  - manufacturer and type of material.
559. What precaution, if any, should be taken to prevent corrosion inside a repaired metal honeycomb structure?
- Prime the repair with a corrosion inhibitor and seal from the atmosphere.\*
  - Paint the outside area with several coats of exterior paint.
  - None. Honeycomb is usually made from a man made or fibrous material which is not susceptible to corrosion.
560. The Dzus turnlock fastener consists of a stud, grommet, and receptacle. The stud diameter is measured in
- tenths of an inch.
  - hundredths of an inch.
  - sixteenths of an inch.\*

561. When repairing large, flat surfaces with polyester resins, warping of the surface is likely to occur. One method of reducing the amount of warpage is to
- add an extra amount of catalyst to the resin.
  - use short strips of fiberglass in the bonded repair\*.
  - use less catalyst than normal so the repair will be more flexible.
562. Cherrymax and Olympic-Lok rivets
- utilize a rivet gun, special rivet set, and bucking bar for installation.
  - utilize a pulling tool for installation.\*
  - may be installed with ordinary hand tools.
563. Hole filling fasteners (for example, MS20470 rivets) should not be used in composite structures primarily because of the
- possibility of causing delamination.\*
  - increased possibility of fretting corrosion in the fastener.
  - difficulty in forming a proper shop head.
564. Metal fasteners used with carbon/graphite composite structures
- may be constructed of any of the metals commonly used in aircraft fasteners.\*
  - must be constructed of material such as titanium or corrosion resistant steel.
  - must be constructed of high strength aluminum-lithium alloy.
565. Sandwich panels made of metal honeycomb construction are used on modern aircraft because this type of construction
- is lighter than single sheet skin of the same strength and is more corrosion resistant.
  - may be repaired by gluing replacement skin to the inner core material with thermoplastic resin.
  - has a high strength to weight ratio.\*
566. (1) When performing a ring (coin tap) test on composite structures, a change in sound may be due to damage or to transition to a different internal structure.  
(2) The extent of separation damage in composite structures is most accurately measured by a ring (coin tap. test) Regarding the above statements,
- both No. 1 and No. 2 are true.
  - only No. 1 is true.\*
  - only No. 2 is true.
567. Which of these methods may be used to inspect fiberglass/honeycomb structures for entrapped water?
- Acoustic emission monitoring.
  - X-ray.
  - Backlighting.
- 1 and 2.\*
  - 1 and 3.
  - 2 and 3.
568. The Dzus turnlock fastener consists of a stud, grommet, and receptacle. The stud length is measured in
- hundredths of an inch.
  - tenths of an inch.
  - sixteenths of an inch.\*
569. What should be the included angle of a twist drill for soft metals?
- 118°.\*
  - 90°.
  - 65°.
570. What is the material layer used within the vacuum bag pressure system to absorb excess resin during curing called?
- Bleeder.\*
  - Breather.
  - Release.
571. What is the most common method of cementing transparent plastics?
- Heat method.
  - Soak method.\*
  - Bevel method.
572. When holes are drilled completely through Plexiglas,
- standard twist drill should be used.
  - specially modified twist drill should be used.\*
  - wood drill should be used.
573. What is the purpose of a gusset or gusset plate used in the construction and repair of aircraft structures?
- To hold structural members in position temporarily until the permanent attachment has been completed.
  - To provide access for inspection of structural attachments.
  - To join and reinforce intersecting structural members.\*
574. Select the alternative which best describes the function of the flute section of a twist drill.
- Prevents overheating of the drill point.
  - Forms the area where the drill bit attaches to the drill motor.
  - Forms the cutting edges of the drill point.\*
575. How many MS20470 AD-4-6 rivets will be required to attach a 10 x 5 inch plate, using a single row of rivets, minimum edge distance, and 4D spacing?
- 56.\*
  - 54.
  - 52.
576. If no scratches are visible after transparent plastic enclosure materials have been cleaned, their surfaces should be
- polished with rubbing compound applied with a damp cloth.
  - buffed with a clean, soft, dry cloth.
  - covered with a thin coat of wax.\*
577. Shallow scratches in sheet metal may be repaired by
- burnishing.
  - buffing.\*
  - stop drilling.

578. The coefficient of expansion of most plastic enclosure materials is
- greater than both steel and aluminum.\*
  - greater than steel but less than aluminum.
  - less than either steel or aluminum.
579. When comparing the machining techniques for stainless steel sheet material to those for aluminum alloy sheet, it is normally considered good practice to drill the stainless steel at a
- higher speed with less pressure applied to the drill.
  - lower speed with more pressure applied to the drill.\*
  - lower speed with less pressure applied to the drill.
580. A single lap sheet splice is to be used to repair a section of damaged aluminum skin. If a double row of 1/8-inch rivets is used, the minimum allowable overlap will be
- 1/2 inch.
  - 3/4 inch.
  - 13/16 inch.\*
581. Which statement is true regarding the inspection of a stressed skin metal wing assembly known to have been critically loaded?
- If rivets show no visible distortion, further investigation is unnecessary.
  - If bearing failure has occurred, the rivet shanks will be joggled.
  - If genuine rivet tipping has occurred, groups of consecutive rivet heads will be tipped in the the same direction.\*
582. What is the minimum edge distance for aircraft rivets?
- Two times the diameter of the rivet shank.
  - Two times the diameter of the rivet head.
  - Three times the diameter of the rivet shank.\*
583. When drilling stainless steel, the drill used should have an included angle of
- 90° and turn at a low speed.
  - 118° and turn at a high speed.\*
  - 140° and turn at a low speed.
584. What is the minimum spacing for a single row of aircraft rivets?
- Two times the diameter of the rivet shank.
  - Three times the length of the rivet shank.
  - Three times the diameter of the rivet shank.\*
585. Longitudinal (fore and aft) structural members of a semi monocoque fuselage are called
- spars and ribs.
  - longerons and stringers.\*
  - spars and stringers.
586. The part of a replacement honeycomb core that must line up with the adjacent original is the
- cell side.
  - ribbon direction.\*
  - cell edge.
587. When making repairs to fiberglass, cleaning of the area to be repaired is essential for a good bond. The final cleaning should be made using
- MEK (methyl ethyl ketone) \*
  - soap, water, and a scrub brush.
  - a thixotropic agent.
588. When necessary, what type of cutting fluid is usually acceptable for machining composite laminates?
- Water soluble oil.
  - Water displacing oil.
  - Water only.\*
589. Fiberglass laminate damage not exceeding the first layer or ply can be repaired by
- filling with a putty consisting of a compatible resin and clean, short glass fibers.\*
  - sanding the damaged area until aerodynamic smoothness is obtained.
  - trimming the rough edges and sealing with paint.
590. Fiberglass damage that extends completely through a laminated sandwich structure
- may be repaired.\*
  - must be filled with resin to eliminate dangerous stress concentrations.
  - may be filled with putty which is compatible with resin.
591. Fiberglass laminate damage that extends completely through one facing and into the core
- cannot be repaired.
  - requires the replacement of the damaged core and facing.\*
  - can be repaired by using a typical metal facing patch.
592. Repairing advanced composites using materials and techniques traditionally used for fiberglass repairs is likely to result in
- restored strength and flexibility.
  - improved wear resistance to the structure.
  - an unairworthy repair.\*
593. Cabin upholstery materials installed in current standard category airplanes must
- be fireproof.
  - be at least flame resistant.\*
  - meet the requirements prescribed in Part 43.
594. Which of the following, when added to wet resins, provide strength for the repair of damaged fastener holes in composite panels?
1. Microballoons.
  2. Flox.
  3. Chopped fibers.
- 2 and 3.\*
  - 1 and 3.
  - 1, 2, and 3.
595. A well designed rivet joint will subject the rivets to
- compressive loads.
  - shear loads.\*
  - tension loads.

596. Which of the following are generally characteristic of aramid fiber (Kevlar) composites?
1. High tensile strength.
  2. Flexibility.
  3. Stiffness.
  4. Corrosive effect in contact with aluminum.
  5. Ability to conduct electricity.
- a. 1 and 2.\*
  - b. 2, 3 and 4.
  - c. 1, 3, and 5.
597. Which of the following are generally characteristic of carbon/graphite fiber composites?
1. Flexibility.
  2. Stiffness.
  3. High compressive strength.
  4. Corrosive effect in contact with aluminum.
  5. Ability to conduct electricity.
- a. 1 and 3.
  - b. 2, 3, and 4.\*
  - c. 1, 3, and 5.
598. If an aircraft's transparent plastic enclosures exhibit fine cracks which may extend in a network over or under the surface or through the plastic, the plastic is said to be
- a. hazing.
  - b. brinelling.
  - c. crazing.\*
599. When installing transparent plastic enclosures which are retained by bolts extending through the plastic material and self-locking nuts, the nuts should be
- a. tightened to a firm fit, plus one full turn.
  - b. tightened to a firm fit, then backed off one full turn\*.
  - c. tightened to a firm fit.
600. If a new safety belt is to be installed in an aircraft, the belt must conform to the strength requirements in which document?
- a. STC 1282.
  - b. FAR Part 39.
  - c. TSO C22.\*
601. Which is considered good practice concerning the installation of acrylic plastics?
- a. When nuts and bolts are used, the plastic should be installed hot and tightened to a firm fit before the plastic cools.
  - b. When rivets are used, adequate spacer or other satisfactory means to prevent excessive tightening of the frame to the plastic should be provided.\*
  - c. When rivets or nuts and bolts are used, slotted holes are not recommended.
602. The preferred way to make permanent repairs on composites is by
- a. bonding on metal or cured composite patches.
  - b. riveting on metal or cured composite patches.
  - c. laminating on new repair plies.\*
603. Composite inspections conducted by means of acoustic emission monitoring
- a. pick up the 'noise' of corrosion or other deterioration occurring.\*
  - b. analyze ultrasonic signals transmitted into the parts being inspected.
  - c. create sonogram pictures of the areas being inspected.
604. Edge notching is generally recommended in butt welding above a certain thickness of aluminum because it
- a. helps hold the metal in alignment during welding.
  - b. aids in the removal or penetration of oxides on the metal surface.
  - c. aids in getting full penetration of the metal and prevents local distortion.\*
605. Which statement concerning a welding process is true?
- a. The inert arc welding process uses an inert gas to protect the weld zone from the atmosphere.\*
  - b. In the metallic arc welding process, filler material, if needed, is provided by a separate metal rod of the proper material held in the arc.
  - c. In the oxyacetylene welding process, the filler rod used for steel is covered with a thin coating of flux.
606. Where should the flux be applied when oxyacetylene welding aluminum?
- a. Painted only on the surface to be welded.
  - b. Painted on the surface to be welded and applied to the welding rod.\*
  - c. Applied only to the welding rod.
607. What purpose does flux serve in welding aluminum?
- a. Removes dirt, grease, and oil.
  - b. Minimizes or prevents oxidation.\*
  - c. Ensures proper distribution of the filler rod.
608. Why are aluminum plates 1/4 inch or more thick usually preheated before welding?
- a. Reduces internal stresses and assures more complete penetration.\*
  - b. Reduces welding time.
  - c. Prevents corrosion and ensures proper distribution of flux.
609. How should a welding torch flame be adjusted to weld stainless steel?
- a. Slightly carburizing.\*
  - b. Slightly oxidizing.
  - c. Neutral.
610. Oxides form very rapidly when alloys or metals are hot. It is important, therefore, when welding aluminum to use a
- a. solvent.
  - b. filler.
  - c. flux.\*

611. In gas welding, the amount of heat applied to the material being welded is controlled by the
- amount of gas pressure used.
  - size of the tip opening.\*
  - distance the tip is held from the work.
612. Oxygen and acetylene cylinders are made of
- seamless aluminum.
  - steel.\*
  - bronze.
613. The shielding gases generally used in the Gas Tungsten Arc (GTA) welding of aluminum consist of
- a mixture of nitrogen and carbon dioxide.
  - nitrogen or hydrogen, or a mixture of nitrogen and hydrogen.
  - helium or argon, or a mixture of helium and argon\*.
614. Annealing of aluminum
- increases the tensile strength.
  - makes the material brittle.
  - removes stresses caused by forming.\*
615. Acetylene at a line pressure above 15 PSI
- is dangerously unstable.\*
  - should be used when a reducing flame is necessary.
  - is usually necessary when welding metal over 3/8-inch thick.
616. If too much acetylene is used in the welding of stainless steel,
- a porous weld will result.\*
  - the metal will absorb carbon and lose its resistance to corrosion.
  - oxide will be formed on the base metal close to the weld.
617. In Gas Tungsten Arc (GTA) welding, a stream of inert gas is used to
- prevent the formation of oxides in the puddle.\*
  - concentrate the heat of the arc and prevent its dissipation.
  - lower the temperature required to properly fuse the metal.
618. Cylinders used to transport and store acetylene
- are pressure tested to 3,000 PSI.
  - are green in color.
  - contain acetone.\*
619. When inspecting a butt welded joint by visual means,
- the penetration should be 25 to 50 percent of the thickness of the base metal.
  - the penetration should be 100 percent of the thickness of the base metal.\*
  - look for evidence of excessive heat in the form of a very high bead.
620. Why is it necessary to use flux in all silver soldering operations?
- To chemically clean the base metal of oxide film.\*
  - To prevent overheating of the base metal.
  - To increase heat conductivity.
621. A welding torch backfire may be caused by
- a loose tip.\*
  - using too much acetylene.
  - same direction.same direction.a tip temperature that is too cool.
622. Which statement best describes magnesium welding?
- Magnesium can be welded to other metals.
  - Filler rod should be nickel steel.
  - Filler rod should be the same composition as base metal.\*
623. The oxyacetylene flame for silver soldering should be
- oxidizing.
  - neutral.\*
  - carburizing.
624. Engine mount members should preferably be repaired by using a
- larger diameter tube with fishmouth and no rosette welds.
  - larger diameter tube with fishmouth and rosette welds.
  - smaller diameter tube with fishmouth and rosette welds.\*
625. What method of repair is recommended for a steel tube longeron dented at a cluster?
- Welded split sleeve.
  - Welded outer sleeve.
  - Welded patch plate.\*
626. Welding over brazed or soldered joints is
- not permitted.\*
  - permissible for mild steel.
  - permissible for most metals or alloys that are not heat treated.
627. Which statement concerning soldering is correct?
- Joints in electric wire to be soldered should be mechanically secure prior to soldering.\*
  - Changeable shades of blue can be observed on the surface of a copper soldering tip when the proper temperature for soldering has been reached.
  - If the soldering temperature is too high, the solder will form in lumps and not produce a positive bond.
628. A resurfaced soldering iron cannot be used effectively until after the working face has been
- fluxed.
  - polished.
  - tinned.\*
629. In selecting a torch tip size to use in welding, the size of the tip opening determines the
- amount of heat applied to the work.\*
  - temperature of the flame.
  - melting point of the filler metal.
630. Why should a carburizing flame be avoided when welding steel?
- It removes the carbon content.
  - It hardens the surface.\*
  - A cold weld will result.

631. The most important consideration(s) when selecting welding rod is/are
- current setting or flame temperature.
  - material compatibility.\*
  - ambient conditions.
632. The oxyacetylene flame used for aluminum welding should
- be neutral and soft.\*
  - be slightly oxidizing.
  - contain an excess of acetylene and leave the tip at a relatively low speed.
633. A very thin and pointed tip on a soldering copper is undesirable because it will
- transfer too much heat to the work.
  - have a tendency to overheat and become brittle.
  - cool too rapidly.\*
634. Filing or grinding a weld bead
- may be performed to achieve a smoother surface.
  - reduces the strength of the joint.\*
  - may be necessary to avoid adding excess weight or to achieve uniform material thickness.
635. Which of the following can normally be welded without adversely affecting strength?
- Aircraft bolts.
  - SAE 4130 chrome/molybdenum tubing.
  - Spring steel struts.
  - Most heat-treated steel/nickel alloy components.
- 2 and 4.
  - 1 and 3.
  - 2.\*
636. Which statement is true in regard to welding heat-treated magnesium?
- The welded section does not have the strength of the original metal.\*
  - Flux should not be used because it is very difficult to remove and is likely to cause corrosion.
  - Magnesium cannot be repaired by fusion welding because of the high probability of igniting the metal.
637. If the vertical fin of a single engine, propeller driven airplane is rigged properly, it will generally be parallel to
- the longitudinal axis but not the vertical axis.
  - the vertical axis but not the longitudinal axis.\*
  - both the longitudinal and vertical axes.
638. What is the purpose of the free wheeling unit in a helicopter drive system?
- It disconnects the rotor whenever the engine stops or slows below the equivalent of rotor RPM.\*
  - It releases the rotor brake for starting.
  - It relieves bending stress on the rotor blades during starting.
639. Movement about the longitudinal axis (roll) in a helicopter is effected by movement of the
- collective pitch control.
  - cyclic pitch control.\*
  - tail rotor pitch control.
640. Other than the manufacturer maintenance manual what other document could be used to determine the primary flight control surface deflection for an imported aircraft that is reassembled after shipment?
- Aircraft type certificate data sheet.\*
  - Import manual for the aircraft.
  - The certificate of airworthiness issued by the importing country.
641. As the angle of attack of an airfoil increases, the center of pressure will
- move toward the trailing edge.
  - remain stationary because both lift and drag components increase proportionally to increased angle of attack.
  - move toward the leading edge.\*
642. If a pilot reports that an airplane flies left wing heavy, this condition may be corrected by
- increasing the angle of incidence of the left wing, or decreasing the angle of incidence of the right wing, or both.\*
  - increasing the dihedral angle of the left wing, or decreasing the dihedral angle of the right wing, or both.
  - adjusting the dihedral angle of the left wing so that differential pressure between the upper and lower wing surfaces is increased.
643. An airplane which has good longitudinal stability should have a minimum tendency to
- roll.
  - pitch.\*
  - yaw.
644. Which statement is correct concerning torque effect on helicopters?
- Torque direction is the same as rotor blade rotation.
  - As horsepower decreases, torque increases.
  - Torque direction is the opposite of rotor blade rotation.\*
645. The acute angle formed by the chord line of a wing and the relative wind is known as the
- longitudinal dihedral angle.
  - angle of incidence.
  - angle of attack.\*
646. The angle of incidence is that acute angle formed by
- the angular difference between the setting of the main airfoil and the auxiliary airfoil (horizontal stabilizer) in reference to the longitudinal axis of the aircraft.
  - a line parallel to the wing chord and a line parallel to the longitudinal axis of the aircraft.\*
  - a line parallel to the wing from root to tip and a line parallel to the lateral axis of the aircraft.
647. An airplane's center of lift is usually located aft of its center of gravity
- so that the airplane will have a tail heavy tendency.
  - so that the airplane will have a nose heavy tendency.\*
  - to improve stability about the longitudinal axis.

648. One purpose of the freewheeling unit required between the engine and the helicopter transmission is to
- automatically disengage the rotor from the engine in case of an engine failure.
  - disconnect the rotor from the engine to relieve the starter load.\*
  - permit practice of autorotation landings.
649. Main rotor blades that do not cone by the same amount during rotation are said to be out of
- balance.
  - collective pitch.
  - track.\*
650. If a single rotor helicopter is in forward horizontal flight, the angle of attack of the advancing blade is
- more than the retreating blade.
  - equal to the retreating blade.
  - less than the retreating blade.\*
651. In a hovering helicopter equipped with a tail rotor, directional control is maintained by
- changing the tail rotor RPM.
  - tilting the main rotor disk in the desired direction.
  - varying the pitch of the tail rotor blades.\*
652. A helicopter in forward flight, cruise configuration, changes direction by
- varying the pitch of the main rotor blades.
  - changing rotor RPM.
  - tilting the main rotor disk in the desired direction\*.
653. In rotorcraft external-loading, the ideal location of the cargo release is where the line of action passes
- after of the center of gravity at all times.
  - forward of the center of gravity at all times.
  - through the center of gravity at all times.\*
654. A decrease in pitch angle of the tail rotor blades on a helicopter
- causes the tail to pivot in the opposite direction of torque rotation around the main rotor axis.\*
  - causes the tail to pivot in the direction of torque rotation around the main rotor axis.
  - is required to counteract main rotor torque produced by takeoff RPM.
655. The vertical flight of a helicopter is controlled by
- collective pitch changes.\*
  - cyclic pitch changes.
  - increasing or decreasing the RPM of the main rotor.
656. The auxiliary (tail) rotor of a helicopter permits the pilot to compensate for and/or accomplish which of the following?
- Attitude and airspeed.
  - Lateral and yaw position.
  - Torque and directional control.\*
657. The correct dihedral angle can be determined by
- measuring the angular setting of each wing at the rear spar with a bubble protractor.
  - placing a straightedge and bubble protractor across the spars while the airplane is in flying position.
  - using a dihedral board and bubble level along the front spar of each wing.\*
658. An airplane is controlled directionally about its vertical axis by the
- rudder.\*
  - elevator
  - ailerons.
659. The purpose in checking main rotor blade tracking is to determine the
- relative position of the blades during rotation.
  - flight path of the blades during rotation.\*
  - extent of an out of balance condition during rotation.
660. If the control stick of an aircraft with properly rigged flight controls is moved forward and to the right, the left aileron will move
- up and the elevator will move down.
  - down and the elevator will move up.
  - down and the elevator will move down.\*
661. The cable operated control system of an all metal aircraft, not incorporating a temperature compensating device, has been rigged to the correct tension in a heated hangar. If the aircraft is operated in very cold weather, the cable tension will
- decrease when the aircraft structure and cables become cold.\*
  - increase when the aircraft structure and cables become cold.
  - be unaffected if stainless steel cable is installed.
662. Very often, repairs to a control surface require static rebalancing of the control surface. Generally, flight control balance condition may be determined by
- checking for equal distribution of weight throughout the control surface.
  - the behavior of the trailing edge when the surface is suspended from its hinge points.\*
  - suspending the control surface from its leading edge in the streamline position and checking weight distribution.
663. Excessive wear on both of the sides of a control cable pulley groove is evidence of
- pulley misalignment.\*
  - cable misalignment.
  - excessive cable tension.
664. Fairleads should never deflect the alignment of a cable more than
- 12°.
  - 8°.
  - 3°.\*

665. Where does the breakage of control cable wires occur most frequently?
- Breakage usually occurs where cables are swaged to turnbuckle and ball terminals.
  - Breakage usually occurs where cables pass over pulleys and through fairleads.\*
  - Breakage sites are unpredictable and usually occur randomly anywhere along the length of a cable.
666. With which system is differential control associated?
- Trim.
  - Aileron.\*
  - Elevator.
667. Which statement concerning the 100-hour inspection of an airplane equipped with a push pull tube type control system is true?
- The threaded rod ends should not be adjusted in length for rigging purposes because the rod ends have been properly positioned and staked during manufacture.
  - The terminal end threads of the turnbuckles should be visible through the safety hole in the barrel.
  - The threaded rod ends should be checked for the amount of thread engagement by means of the inspection hole provided.\*
668. If control cables are adjusted properly and the control surfaces tend to vibrate, the probable cause is
- worn attachment fittings.\*
  - oil can effects on the control surfaces.
  - excessive cable tension.
669. Aircraft flight control trim systems must be designed and installed so that the
- pilot can determine the relative position of the trim tab from the cockpit.\*
  - operating control and the trim tab will always move in the same direction.
  - trim system will disengage or become inoperative if the primary flight control system fails.
670. Stability about the axis which runs parallel to the line of flight is referred to as
- longitudinal stability.
  - lateral stability.\*
  - directional stability.
671. The purpose of spring tabs or servo tabs is to
- assist the pilot in moving the control surfaces.\*
  - contribute to the static balance of the control surface.
  - make in flight trim adjustments possible.
672. The primary purpose of stall strips is to
- provide added lift at slow speeds.
  - stall the inboard portion of the wings first.\*
  - provide added lift at high angles of attack.
673. Movement of the cockpit control toward the nosedown position during a ground operational check of the elevator trim tab system will cause the trailing edge of the trim tab to move in which direction?
- Downward regardless of elevator position.
  - Upward regardless of elevator position.
  - Downward if the elevator is in the UP position and upward if the elevator is in the DOWN position.\*
674. The purpose of the vertical fin is to provide
- directional stability.\*
  - longitudinal stability.
  - lateral stability.
675. If the travel of an airplane's controls is correct but the cables are rigged exceptionally tight, what probable effect will this have when flying the airplane?
- The airplane will tend to fall off on one wing.
  - The airplane will be heavy on the controls.\*
  - The pilot will be unable to fly the airplane hands off.
676. During inspection of the flight control system of an airplane equipped with differential-type aileron control, side to side movement of the control stick will cause
- each aileron to have a greater up travel (from the streamlined position) than down travel.\*
  - each aileron to have greater down travel (from the streamlined position) than up travel.
  - the left aileron to move through a greater number of degrees (from full up to full down) than the right aileron.
677. A universal propeller protractor used to measure the degrees of aileron travel should be zeroed
- with the aileron in the NEUTRAL position.\*
  - with the aileron in the DOWN position.
  - when the aircraft is in a level flight attitude.
678. The universal propeller protractor can be used to measure
- propeller track.
  - aspect ratio of a wing.
  - degrees of flap travel.\*
679. A tension regulator in the flight control cable system of a large all metal aircraft is used primarily to
- increase the cable tension in cold weather.
  - provide a means of changing cable tension in flight.
  - retain a set tension.\*
680. Acceptable 3/16 cable tension range.
- 130 pounds minimum, 140 pounds maximum.
  - 117 pounds minimum, 143 pounds maximum.\*
  - 120 pounds minimum, 140 pounds maximum.
681. Differential control on an aileron system means that
- the down travel is more than the up travel.
  - the up travel is more than the down travel.\*
  - one aileron on one wing travels further up than the aileron on the Sopposite wing to adjust for wash in and wash out.



682. Why is it generally necessary to jack an aircraft indoors for weighing?
- So aircraft may be placed in a level position.
  - So that air currents do not destabilize the scales.\*
  - So weighing scales may be calibrated to 0 pounds.
683. Which should be accomplished before jacking aircraft?
- Install critical stress panels or plates.\*
  - Determine that the fuel tanks are empty.
  - Make sure the aircraft is leveled laterally.
684. How are changes in direction of a control cable accomplished?
- Pulleys.\*
  - Bell cranks.
  - Fairleads.
685. If the control stick of an aircraft with properly rigged flight controls is moved rearward and to the left, the right aileron will move
- down and the elevator will move down.
  - up and the elevator will move down.
  - down and the elevator will move up.\*
686. The dihedral angle of a wing may be measured by placing a straightedge and level protractor on the
- front spar.
  - wing root.\*
  - wing chord.
687. Washing in the left wing of a monoplane, for purposes of rigging corrections after flight test, will have what effect on the lift and drag of that wing?
- Both drag and lift will decrease due to decreased angle of attack.
  - Both drag and lift will increase due to increased angle of attack.\*
  - The drag will decrease due to the effect of the lift increase.
688. What type of flap system increases the wing area and changes the wing camber?
- Fowler flaps.\*
  - Slotted flaps.
  - Split flaps.
689. If the right wing of a monoplane is improperly rigged to a greater angle of incidence than designated in the manufacturer's specifications, it will cause the
- airplane to be off balance both laterally and directionally.\*
  - airplane to pitch and roll about the lateral axis.
  - right wing to have both an increased lift and a decreased drag.
690. The chord of a wing is measured from
- wingtip to wingtip.
  - wing root to the wingtip.
  - leading edge to trailing edge.\*
691. When the lift of an airfoil increases, the drag will
- decrease.
  - also increase.\*
  - increase while the lift is changing but will return to its original value.
692. What physical factors are involved in the aspect ratio of airplane wings?
- Thickness and chord.
  - Span and chord.\*
  - Dihedral and angle of attack.
693. Improper rigging of the elevator trim tab system will affect the balance of the airplane about its
- lateral axis.\*
  - longitudinal axis.
  - vertical axis.
694. An airplane that has a tendency to gradually increase a pitching moment that has been set into motion has
- poor longitudinal stability.\*
  - good lateral stability.
  - poor lateral stability.
695. The purpose of wing slats is to
- reduce stalling speed.\*
  - decrease drag.
  - increase speed on takeoff.
696. The angle of incidence of an airplane
- affects the dihedral of the wings.
  - is that angle between the relative wind and the chord of the wing.
  - does not change in flight.\*
697. Buffeting is the intermittent application of forces to a part of an airplane. It is caused by
- incorrect rigging of flaps.
  - an unsteady flow from turbulence.\*
  - incorrect rigging of ailerons.
698. Placing a piece of cloth around a stainless steel control cable and running it back and forth over the length of the cable is generally a satisfactory method of
- applying par-al-ketone.
  - inspecting for broken wires.\*
  - inspecting for wear or corrosion.
699. Rigging and alignment checks should not be undertaken in the open; however, if this cannot be avoided, the aircraft should be positioned
- obliquely into the wind.
  - facing any direction since it makes no difference if the wind is steady (not gusting).
  - with the nose into the wind.\*
700. What is the smallest size cable that may be used in aircraft primary control systems?
- 1/4 inch.
  - 5/16 inch.
  - 1/8 inch.\*

701. Where would you find precise information to perform a symmetry alignment check for a particular aircraft?
- Aircraft Specification or Type Certificate Data Sheet.
  - Manufacturer's service bulletins.
  - Aircraft service or maintenance manual.\*
702. Where is the buttock line or butline of an aircraft?
- A height measurement horizontal centerline.
  - A width measurement left of, and perpendicular to, the vertical centerline.
  - A width measurement left or right of, and parallel to, the vertical centerline.\*
703. Where is fuselage station No. 137 located?
- 137 centimeters aft of the nose or fixed reference line.
  - 137 inches aft of the zero or fixed reference line.\*
  - After of the engine.
704. Proper wing twist in a sheet metal constructed wing can usually be checked by utilizing a
- plum bob, string, and straightedge.
  - bubble level and special fixtures described by the manufacturer.\*
  - straightedge, tape measure, and carpenter's square.
705. The vast majority of aircraft control cables are terminated with swaged terminals, that must be
- corrosion treated to show compliance with the manufacturers requirements after the swaging operation.
  - pull tested to show compliance with the manufactures requirements after the swaging operation.
  - checked with a go-no-go gauge before and after, to show compliance with the manufacturers requirements after the swaging operation.\*
706. What nondestructive checking method is normally used to ensure that the correct amount of swaging has taken place when installing swaged-type terminals on aircraft control cable?
- Measure the finished length of the terminal barrel and compare with the beginning length.
  - Use a terminal gauge to check the diameter of the swaged portion of the terminal.\*
  - Check the surface of the swaged portion of the terminal for small cracks which indicate incomplete swaging.
707. When inspecting a control cable turnbuckle for proper installation, determine that
- no more than four threads are exposed on either side of the turnbuckle barrel.
  - the terminal end threads are visible through the safety hole in the barrel.
  - the safety wire ends are wrapped a minimum of four turns around the terminal end shanks.\*
708. If all instructions issued by the swaging tool manufacturer are followed when swaging a cable terminal, the resultant swaged terminal strength should be
- the full rated strength of the cable.\*
  - 80 percent of the full rated strength of the cable.
  - 70 percent of the full rated strength of the cable.
709. Which is an acceptable safety device for a castle nut when installed on secondary structures?
- Star washer.
  - Lockwasher.
  - Cotter pin.\*
710. When used in close proximity to magnetic compasses, cotter pins are made of what material?
- Corrosion resisting steel.\*
  - Anodized aluminum alloy.
  - Cadmium plated low carbon steel.
711. When a fiber or nylon insert-type, self-locking nut can be threaded on a bolt or stud through the insert with only the fingers, it should be
- re-torqued frequently.
  - rejected.\*
  - reused only in a different location.
712. The elevators of a conventional airplane are used to provide rotation about the
- longitudinal axis.
  - lateral axis.\*
  - vertical axis.
713. Movement of an airplane along its lateral axis (roll) is also movement
- around or about the longitudinal axis controlled by the elevator.
  - around or about the lateral axis controlled by the ailerons.
  - around or about the longitudinal axis controlled by the ailerons.\*
714. Wing dihedral, a rigging consideration on most airplanes of conventional design, contributes most to stability of the airplane about its
- longitudinal axis.\*
  - vertical axis.
  - lateral axis.
715. After repairing or re covering a rudder, the surface should be rebalanced
- to its spanwise axis.
  - in its normal flight position.
  - to manufacturer's specifications.\*
716. Movement about the lateral axis (pitch) in a helicopter is effected by movement of the
- collective pitch control.
  - cyclic pitch control.\*
  - tail rotor pitch control.

717. The maximum time a 100-hour inspection may be extended is
- 10 hours.\*
  - 10 hours with a special flight permit.
  - 12 hours with a special flight permit.
718. Large airplanes and turbine-powered multiengine airplanes operated under Federal Aviation Regulation Part 91, General Operating and Flight Rules, must be inspected
- in accordance with an inspection program authorized under Federal Aviation Regulation Part 91, Subpart E.
  - in accordance with a continuous airworthiness maintenance program (camp program) authorized under Federal Aviation Regulation Part 91, Subpart E.\*
  - in accordance with the progressive inspection requirements of Federal Aviation Regulation Section 91.409(d).
719. Where would you find the operating conditions that make a 100-hour inspection mandatory?
- 14 CFR part 91.\*
  - 14 CFR part 43.
  - AC 43.13-2A.
720. Which statement is correct when an aircraft has not been approved for return to service after an annual inspection because of several items requiring minor repair?
- Only the person who performed the annual inspection may approve the aircraft for return to service.
  - An appropriately rated mechanic may repair the defects and approve the aircraft for return to service.\*
  - An appropriately rated mechanic may repair the defects, but an IA must approve the aircraft for return to service.
721. An aircraft that is required by Section 91.409, to have a 100-hour inspection may be flown beyond the inspection requirement
- if necessary to reach a place at which the inspection can be accomplished, but not to exceed 10 flight hours.\*
  - if necessary to reach a place at which the inspection can be accomplished, but a special flight permit is necessary.
  - if necessary to reach a place at which the inspection can be accomplished, but not to exceed 15 flight hours.
722. Radio equipment installations made in accordance with Supplemental Type Certificate data require approval for return to service
- by a field approval from the FAA.
  - by an airframe and powerplant mechanic.
  - by the holder of an inspection authorization.\*
723. Which statement is correct regarding an aircraft that is found to be unairworthy after an annual inspection, due to an item requiring a major repair (assuming approved data is used to accomplish the repair)?
- An appropriately rated mechanic may accomplish the repair, and an IA may approve the aircraft for return to service.\*
  - An appropriately rated mechanic or repair station may repair the defect and approve the aircraft for return to service.
  - Only the person who performed the annual inspection may approve the aircraft for return to service, after the major repair.
724. When overhauling electrical equipment, all necessary information should be obtained from
- the aircraft maintenance manual.
  - maintenance instructions published by the aircraft and/or equipment manufacturer.\*
  - illustrated parts manual for the aircraft.
725. Which statement about Airworthiness Directives (AD's) is true?
- AD's are information alert bulletins issued by the airframe, powerplant, or component manufacturer.
  - Compliance with an AD is not mandatory unless the aircraft affected is for hire.
  - Compliance with an applicable AD is mandatory and must be recorded in the maintenance records.\*
726. Where would you find the recommended statement for recording the approval or disapproval for return to service of an aircraft after a 100-hour or annual inspection?
- 14 CFR Part 65.
  - 14 CFR Part 43.\*
  - 14 CFR Part 91.
727. An aircraft that is due an annual inspection may be flown
- if a special permit has been issued for the aircraft.\*
  - for the purpose of performing maintenance.
  - for a period of time not to exceed 10 hours.
728. Aircraft tire pressure should be checked
- using only a push on stick-type gauge having 1-pound increments.
  - at least once a week or more often.\*
  - as soon as possible after each flight.
729. If the extended longitudinal axis of the main landing gear wheel assemblies intersects aft of the aircraft, the wheels can be termed as having
- toe out.\*
  - toe in.
  - negative camber.
730. What should be checked when a shock strut bottoms during a landing?
- Air pressure.
  - Packing seals for correct installation.
  - Fluid level.\*

731. What is the purpose of a compensating port or valve in a brake master cylinder of an independent brake system?
- Assists in the master cylinder piston return.
  - Prevents fluid from flowing back to the reservoir.
  - Permits the fluid to flow toward or away from the reservoir as material which is not affected by either stress is the temperature changes.\*
732. Overinflated aircraft tires may cause damage to the
- brake linings.
  - wheel hub.
  - wheel flange.\*
733. If an aircraft shock strut (air/oil type) bottoms upon initial landing contact, but functions correctly during taxi, the most probable cause is
- low fluid.\*
  - low air charge.
  - a restricted metering pin orifice.
734. What is the function of a cam incorporated in a nose gear shock strut?
- Provides an internal shimmy damper.
  - Straightens the nosewheel.\*
  - Provides steering of aircraft during ground operation.
735. Extension of an oleo shock strut is measured to determine the
- amount of oil in the strut.
  - physical condition of the strut itself.
  - proper operating position of the strut.\*
736. Debooster cylinders are used in brake systems primarily to
- reduce brake pressure and maintain static pressure.
  - relieve excessive fluid and ensure a positive release.
  - reduce the pressure to the brake and increase the volume of fluid flow.\*
737. If a shock strut bottoms after it has been properly serviced, the
- strut should be disassembled and the metering pin orifice plate replaced.
  - air pressure should be increased.
  - strut should be removed, disassembled, and inspected.\*
738. The purpose of a relief valve in a brake system is to
- reduce pressure for brake application.
  - prevent the tire from skidding.
  - compensate for thermal expansion.\*
739. If an airplane equipped with master cylinders and single disk brakes has excessive brake pedal travel, but the brakes are hard and effective, the probable cause is
- the master cylinder one way cup is leaking.
  - worn brake linings.\*
  - worn brake disk causing excessive clearance between the notches on the perimeter of the disk and the splines or keys on the wheel.
740. A high speed aircraft tire with a sound cord body and bead may be recapped
- a maximum of three times.
  - only by the tire manufacturer.
  - an indefinite number of times.\*
741. The fusible plugs installed in some aircraft wheels will
- indicate tire tread separation.
  - prevent overinflation.
  - melt at a specified elevated temperature.\*
742. When servicing an air/oil shock strut with MIL-5606 the strut should be
- collapsed and fluid added at the filler opening.\*
  - fully extended and fluid added at the filler opening.
  - partially extended and fluid added at the filler opening.
743. Debooster valves are used in brake systems primarily to
- ensure rapid application and release of the brakes.
  - reduce brake pressure and maintain static pressure.
  - reduce the pressure and release the brakes rapidly\*.
744. Instructions concerning the type of fluid and amount of air pressure to be put in a shock strut are found
- on the airplane data plate.
  - in the aircraft operations limitations.
  - in the aircraft manufacturer's service manual.\*
745. The repair for an out of tolerance toe in condition of main landing gear wheels determined not to be the result of bent or twisted components consists of
- shimming the axle in the oleo trunnion.
  - inserting, removing, or changing the location of washers or spacers at the center pivotal point of the scissor torque links.\*
  - placing shims or spacers behind the bearing of the out of tolerance wheel or wheels.
746. An embossed letter 'H' on an air valve core stem
- is the manufacturer's trademark.
  - indicates hydraulic type.
  - indicates high-pressure type.\*
747. The primary purpose for balancing aircraft wheel assemblies is to
- prevent heavy spots and reduce vibration.\*
  - distribute the aircraft weight properly.
  - reduce excessive wear and turbulence.
748. The removal, installation, and repair of landing gear tires by the holder of a private pilot certificate on an aircraft owned or operated is considered to be
- a violation of the Federal Aviation Regulations.
  - a minor repair.
  - preventive maintenance.\*

749. On all aircraft equipped with retractable landing gear, some means must be provided to
- retract and extend the landing gear if the normal operating mechanism fails.
  - extend the landing gear if the normal operating mechanism fails.\*
  - prevent the throttle from being reduced below a safe power setting while the landing gear is retracted.
750. The pressure source for power brakes is
- the main hydraulic system.\*
  - the power brake reservoir.
  - a master cylinder.
751. What is the purpose of the torque links attached to the cylinder and piston of a landing gear oleo strut?
- Limit compression stroke.
  - Hold the strut in place.
  - Maintain correct wheel alignment.\*
752. The correct inflation pressure for an aircraft tire can be obtained from
- tire manufacturer's specifications.
  - the aircraft service manual.\*
  - the information stamped on the aircraft wheel.
753. When an air/oil type of landing gear shock strut is used, the initial shock of landing is cushioned by
- compression of the air charge.
  - the fluid being forced through a metered opening.\*
  - compression of the fluid.
754. Internal leakage in a brake master cylinder unit can cause
- slow release of brakes.
  - the pedal to slowly creep down while pedal pressure is applied.
  - fading brakes.\*
755. A sleeve, spacer, or bumper ring is incorporated in a landing gear oleo shock strut to
- limit the extension of the torque arm.
  - limit the extension stroke.\*
  - reduce the rebound effect.
756. The purpose of a sequence valve in a hydraulic retractable landing gear system is to
- prevent heavy landing gear from falling too rapidly upon extension.
  - provide a means of disconnecting the normal source of hydraulic power and connecting the emergency source of power.
  - ensure operation of the landing gear and gear doors in the proper order.\*
757. Power boost brake systems are used on aircraft that have
- high landing speeds.
  - low normal hydraulic system pressure.\*
  - more than one brake assembly per axle.
758. A pilot reports that the brake pedals have excessive travel. A probable cause is
- brake rotors have worn.\*
  - lack of fluid in the brake system.
  - brake lining has oil or some foreign matter on the disks and linings.
759. The purpose of an orifice check valve is to
- relieve pressure to a sensitive component.
  - restrict flow in one direction and allow free flow in the other.\*
  - relieve pressure in one direction and prevent flow in the other direction.
760. A special bolt in a landing gear attachment requires a torque value of 440 inch-pounds. How many foot pounds are required?
- 36.8.
  - 38.
  - 36.6.\*
761. What condition would most likely cause excessive fluctuation of the pressure gauge when the hydraulic pump is operating?
- Accumulator air pressure low.
  - Inadequate supply of fluid.\*
  - System relief valve sticking closed.
762. An O ring intended for use in a hydraulic system using MIL-H-5606 (mineral base) fluid will be marked with
- a blue stripe or dot.\*
  - one or more white dots.
  - a white and yellow stripe.
763. A hydraulic hose identified as MIL-H-8794 will have a yellow stripe running the length of the hose. This stripe
- is used to ensure that the hose is installed without excessive twisting.\*
  - identifies that the hose is for hydraulic fluid only.
  - identifies that the hose is constructed of synthetic rubber and may be suitable for a wide range of applications.
764. A hydraulic system referred to as a 'power pack' system will
- have an engine driven pump for greater pressure.
  - have all hydraulic power components located in one unit.\*
  - have a pressurized reservoir.
765. Which statement is true with respect to an aircraft equipped with hydraulically operated multiple disk type brake assemblies?
- There are no minimum or maximum disk clearance checks required due to the use of self compensating cylinder assemblies.
  - Do not set parking brake when brakes are hot.\*
  - No parking brake provisions are possible for this type of brake assembly.

766. What device in a hydraulic system with a constant delivery pump allows circulation of the fluid when no demands are on the system?
- Pressure relief valve.
  - Shuttle valve.
  - Pressure regulator.\*
767. Nose gear centering cams are used in many retractable landing gear systems. The primary purpose of the centering device is to
- align the nosewheel prior to touchdown.
  - engage the nosewheel steering.
  - center the nosewheel before it enters the wheel well.\*
768. Chines are used on some aircraft nose wheel tires to
- help nose gear extension at higher air speeds.
  - help reduce the possibility of hydroplaning.
  - help deflect water away from the fuselage.\*
769. How long should you wait after a flight before checking tire pressure?
- At least 2 hours (3 hours in hot weather).\*
  - At least 3 hours (4 hours in hot weather).
  - At least 4 hours (5 hours in hot weather).
770. A filter incorporating specially treated cellulose paper is identified as a
- sediment trap.
  - cuno filter.
  - micronic filter.\*
771. The rubber seals used in a landing gear shock strut
- are generally designed to be compatible with more than one type of fluid.
  - are kept from direct contact with fluid by teflon or nylon backup rings.
  - may be used only with a specific type of fluid.\*
772. Lockout deboosters generally
- allow full deboost piston travel without fluid from the high pressure side entering the low pressure chamber.\*
  - cannot allow full deboost piston travel without fluid from the high pressure side entering the low pressure chamber.
  - must be bled separately after brake bleeding has been completed.
773. An electric motor used to raise and lower a landing gear would most likely be a
- shunt field series wound motor.
  - split field shunt wound motor.
  - split field series wound motor.\*
774. A landing gear position and warning system will provide a warning in the cockpit when the throttle is
- retarded and gear is not down and locked.\*
  - advanced and gear is down and locked.
  - retarded and gear is down and locked.
775. Excessive wear in the center of the tread of an aircraft tire is an indication of
- incorrect camber.
  - excessive toe out.
  - overinflation.\*
776. When an empty shock strut is filled with fluid, care should be taken to extend and compress the strut completely at least two times to
- thoroughly lubricate the piston rod.
  - force out any excess fluid.
  - ensure proper packing ring seating and removal of air bubbles.\*
777. In shock struts, chevron seals are used to
- absorb bottoming effect.
  - prevent oil from escaping.\*
  - serve as a bearing surface.
778. On most aircraft, the oil level of an air and oil shock strut is checked by
- removing the oil filler plug and inserting a gauge.
  - measuring the length of the strut extension with a certain air pressure in the strut.
  - releasing the air and seeing that the oil is to the level of the filler plug.\*
779. How can it be determined that all air has been purged from a master cylinder brake system?
- By operating a hydraulic unit and watching the system pressure gauge for smooth, full scale deflection.
  - By noting whether the brake is firm or spongy.\*
  - By noting the amount of fluid return to the master cylinder upon brake release.
780. The best safeguards against heat buildup in aircraft tires are
- proper tire inflation, minimum braking, and ground rolls into the wind.
  - short ground rolls, slow taxi speeds, minimum braking, and proper tire inflation.\*
  - minimum braking, proper tire inflation, and long ground rolls.
781. In brake service work, the term 'bleeding brakes' is the process of
- withdrawing air only from the system.
  - withdrawing fluid from the system for the purpose of removing air that has entered the system.\*
  - replacing small amounts of fluid in reservoir.
782. What is one effect a restricted compensator port of a master cylinder will have on a brake system?
- The brakes will operate normally.
  - The reservoir will be filled by reverse flow.
  - The restriction will cause slow release of the brakes.\*

783. Aircraft brakes requiring a large volume of fluid to operate the brakes generally
- use independent master cylinder systems.
  - do not use brake system accumulators.
  - use power brake control valves.\*
784. What would be the effect if the piston return spring broke in a brake master cylinder?
- The brakes would become spongy.
  - The brake travel would become excessive.
  - The brakes would drag.\*
785. To prevent a very rapid extension of an oleo shock strut after initial compression resulting from landing impact,
- various types of valves or orifices are used which restrict the reverse fluid flow.\*
  - the metering pin gradually reduces the size of the orifice as the shock strut extends.
  - the air is forced through a restricted orifice in the reverse direction.
786. Pilot reports the right brake on an aircraft is spongy when the brake pedal is depressed in a normal manner. The probable cause is
- the hydraulic master cylinder piston is sticking.
  - air in the brake hydraulic system.\*
  - the hydraulic master cylinder piston return spring is weak.
787. The metering pins in oleo shock struts serve to
- lock the struts in the DOWN position.
  - retard the flow of oil as the struts are compressed.\*
  - meter the proper amount of air in the struts.
788. After performing maintenance on an aircraft's landing gear system which may have affected the system's operation, it is usually necessary to
- conduct a flight test.
  - re-inspect the area after the first flight.
  - make an operational check with the aircraft on jacks\*
789. Why do tire and wheel manufacturers often recommend that the tires on split rim wheels be deflated before removing the wheel from the axle?
- To relieve the strain on the wheel retaining nut and axle threads.
  - As a safety precaution in case the bolts that hold the wheel halves together have been damaged or weakened.\*
  - To remove the static load imposed upon the wheel bearings by the inflated tire.
790. A stripe or mark applied to a wheel rim and extending onto the sidewall of a tube type tire is a
- slippage mark.\*
  - wheel-to-tire balance mark.
  - wheel weight reference mark..
791. The braking action of a Cleveland disk brake is accomplished by compressing a rotating brake disk between two opposite brake linings. How is equal pressure on both sides of the rotating disk assured?
- By allowing the brake rotor to float to automatically equalize as pressure is applied to the rotor.
  - By allowing the caliper to float to automatically equalize as pressure is applied to the rotor.\*
  - By allowing the brake linings to automatically equalize as pressure is applied to the rotor.
792. If it is determined that spongy brake action is not caused by air in the brake system, what is the next most likely cause?
- Worn brake lining.
  - Internal leakage in the master cylinder.
  - Deteriorated flexible hoses.\*
793. Many brake types can be adapted to operate mechanically or hydraulically. Which type is not adaptable to mechanical operation?
- Single disk spot type.
  - Single servo type.
  - Expander tube type.\*
794. Why do most aircraft tire manufacturers recommend that the tubes in newly installed tires be first inflated, fully deflated, and then reinflated to the correct pressure?
- To allow the tube to position itself correctly inside the tire.\*
  - To eliminate all the air between the tube and the inside of the tire.
  - To test the entire assembly for leaks.
795. Exposure to and/or storage near which of the following is considered harmful to aircraft tires?
- Low humidity.
  - Fuel.
  - Oil.
  - Ozone.
  - Helium.
  - Electrical equipment.
  - Hydraulic fluid.
  - Solvents.
- 2, 3, 4, 5, 6, 7, 8.
  - 1, 2, 3, 5, 7, 8.
  - 2, 3, 4, 6, 7, 8.\*
796. Which must be done before adjusting the relief valve of a main hydraulic system incorporating a pressure regulator?
- Eliminate the action of the unloading valve.\*
  - Adjust all other system relief valves which have a lower pressure setting.
  - Manually unseat all system check valves to allow unrestricted flow in both directions.

797. Many hydraulic reservoirs contain a small quantity of fluid which is not available to the main system pump. This fluid is retained to
- prime the main system.
  - supply fluid to the auxiliary pump.\*
  - supply fluid to the pressure accumulator.
798. The unit which causes one hydraulic operation to follow another in a definite order is called a
- selector valve.
  - sequence valve.\*
  - shuttle valve.
799. The purpose of a hydraulic pressure regulator is to
- prevent the system pressure from rising above a predetermined amount due to thermal expansion.
  - boost the pressure in portions of the system.
  - relieve the pump of its load when no actuating units are being operated.\*
800. Severe kickback of the emergency hydraulic hand pump handle during the normal intake stroke will indicate which of the following?
- The hand pump inport check valve is sticking open.
  - The main system relief valve is set too high.
  - The hand pump outport check valve is sticking open.\*
801. What type of valve in an aircraft hydraulic system permits fluid to flow freely in one direction, but restricts the rate at which fluid is allowed to flow in the other direction?
- Check valve.
  - Orifice restrictor.
  - Orifice check valve.\*
802. The main system pressure relief valve in a simple hydraulic system equipped with a power control valve should be adjusted
- with the power control valve held in the CLOSED position.\*
  - while one or more actuating units are in operation.
  - with the power control valve in the OPEN position.
803. A hydraulic accumulator is charged with an air preload of 1,000 PSI. When a hydraulic system pressure of 3,000 PSI is developed, the pressure on the air side of the accumulator will be
- 1,000 PSI.
  - 3,000 PSI.\*
  - 4,000 PSI.
804. After a hydraulic accumulator has been installed and air chamber charged, the main system hydraulic pressure gauge will not show a hydraulic pressure reading until
- at least one selector valve has been actuated to allow fluid to flow into the fluid side of the accumulator.
  - the air pressure has become equal to the fluid pressure.
  - the fluid side of the accumulator has been charged.\*
805. Using a hand pump, pressure of 100 PSI has been built up in a hydraulic system. The hand pump piston is 1 inch in diameter. A 1/2-inch line connects the hand pump to an actuating cylinder 2 inches in diameter. What is the pressure in the line between the hand pump and the actuator?
- 100 PSI.\*
  - 150 PSI.
  - 200 PSI.
806. Which seals are used with vegetable base hydraulic fluids?
- Silicone rubber.
  - Butyl rubber.
  - Natural rubber.\*
807. The air that is expended and no longer needed when an actuating unit is operated in a pneumatic system is
- exhausted or dumped, usually overboard.\*
  - returned to the compressor.
  - charged or pressurized for use during the next operating cycle.
808. Some hydraulic systems incorporate a device which is designed to remain open to allow a normal fluid flow in the line, but closed if the fluid flow increases above an established rate. This device is generally referred to as a
- hydraulic fuse.\*
  - flow regulator.
  - metering check valve.
809. When hydraulic system pressure control and relief units fail to function properly, how are most systems protected against overpressure?
- A shear section on the main hydraulic pump drive shaft.\*
  - One or more hydraulic fuses installed in the pressure and return lines.
  - A shuttle valve interconnecting the main and emergency systems.
810. How is the air in a hydraulic accumulator prevented from entering the fluid system?
- By forcing the oil/air mixture through a centrifugal separating chamber that prevents the air from leaving the accumulator.
  - By physically separating the air chamber from the oil chamber with a flexible or movable separator.\*
  - By including a valve that automatically closes when the fluid level lowers to a preset amount.
811. Most variable displacement hydraulic pumps of current design
- must be driven at a nearly constant speed in order to be practical for use.
  - are not practical for use with a closed center hydraulic system.
  - contain a built in means of system pressure regulation.\*



812. The primary function of the flap overload valve is to
- prevent the flaps from being lowered at airspeeds which would impose excessive structural loads.\*
  - cause the flap segments located on opposite sides of the aircraft centerline to extend and retract together so that the aircraft will not become aerodynamically unbalanced to the extent that it becomes uncontrollable.
  - boost normal system pressure to the flaps in order to overcome the air loads acting on the relatively large flap area.
813. A unit which transforms hydraulic pressure into linear motion is called
- an actuating cylinder.\*
  - an accumulator.
  - a hydraulic pump.
814. If it is necessary to adjust several pressure regulating valves in a hydraulic system, what particular sequence, if any, should be followed?
- Units most distant from the hydraulic pump should be adjusted first.
  - Units with the highest pressure settings are adjusted first.\*
  - Units are independent of each other, and therefore, no particular sequence is necessary.
815. If an aircraft's constant pressure hydraulic system cycles more frequently than usual and no fluid leakage can be detected, the most probable cause is
- a too high relief valve setting.
  - pump volume output too high.
  - low accumulator air preload.\*
816. Unloading valves are used with many engine driven hydraulic pumps to
- dampen out pressure surges.
  - relieve the pump pressure.\*
  - relieve system pressure.
817. What safety device is usually located between the driving unit and hydraulic pump drive shaft?
- Thermal relief valve.
  - Pump motor safety switch.
  - Pump drive coupling shear section.\*
818. Which is true regarding the ground check of a flap operating mechanism which has just been installed?
- If the time required to operate the mechanism increases with successive operations, it indicates the air is being worked out of the system.
  - If the time required to operate the mechanism decreases with successive operations, it indicates the air is being worked out of the system.\*
  - All hydraulic lines and components should be checked for leaks by applying soapy water to all connections.
819. Excluding lines, which components are required to make up a simple hydraulic system?
- Actuator, pressure reservoir, accumulator, and selector valve.
  - Pump, reservoir, selector valve, and actuator.\*
  - Pump, reservoir, relief valve, and shuttle valve.
820. A hydraulic system operational check during ground runup of an aircraft indicates that the wing flaps cannot be lowered using the main hydraulic system, but can be lowered by using the emergency hand pump. Which is the most likely cause?
- The flap selector valve has a severe internal leak.
  - The pressure accumulator is not supplying pressure to the system.
  - The fluid level in the reservoir is low.\*
821. In a gear type hydraulic pump, a mechanical safety device incorporated to protect the pump from overload is the
- bypass valve.
  - check valve.
  - shear pin.\*
822. After installation of a rebuilt hydraulic hand pump, it is found that the handle cannot be moved in the pumping direction (pressure stroke). The most likely cause is an incorrectly installed
- hand pump inport check valve.
  - inport/outport orifice check valve.
  - hand pump outport check valve.\*
823. Pressure is a term used to indicate the force per unit area. Pressure is usually expressed in
- pounds per square inch.\*
  - pounds per inch.
  - pounds per cubic inch.
824. If two actuating cylinders which have the same cross sectional area but different lengths of stroke are connected to the same source of hydraulic pressure, they will exert
- different amounts of force but will move at the same rate of speed.
  - equal amounts of force but will move at different rates of speed.
  - equal amounts of force and will move at the same rate of speed.\*
825. What happens to the output of a constant displacement hydraulic pump when the hydraulic system pressure regulator diverts the fluid from the system to the reservoir?
- The output pressure remains the same, but the volume reduces.
  - The output pressure reduces, but the volume remains the same.\*
  - The output pressure and volume remain the same.

826. Heat exchanger cooling units are required in some aircraft hydraulic systems because of
- fluid flammability.
  - high pressures and high rates of fluid flow.\*
  - the high heat generated from braking.
827. Which valve installed in a hydraulic system will have the highest pressure setting?
- Pressure regulator valve.
  - Main relief valve.
  - Thermal relief valve.\*
828. How many of these seals are used with petroleum base hydraulic fluids?
- Synthetic rubber.
  - Natural rubber.
  - Neoprene rubber.
- One.
  - Two.\*
  - Three.
829. If the hydraulic system pressure is normal while the engine driven pump is running, but there is no pressure after the engine has been shut off, it indicates
- the system relief valve setting is too high.
  - no air pressure in the accumulator.\*
  - the pressure regulator is set too high.
830. Although dents in the heel of a bend are not permissible, they are acceptable in the remainder of a hydraulic tube providing they are less than what percent of the tube diameter?
- 5.
  - 10.\*
  - 20.
831. The primary purpose of a hydraulic actuating unit is to transform
- fluid motion into mechanical pressure and back again.
  - fluid pressure into useful work.\*
  - energy from one form to another.
832. If hydraulic fluid is released when the air valve core of the accumulator is depressed, it is evidence of
- excessive accumulator air pressure.
  - a leaking check valve.
  - a ruptured diaphragm or leaking seals.\*
833. Which is a characteristic of synthetic base hydraulic fluid?
- Low moisture retention.
  - High flash point.\*
  - Low flash point.
834. If an engine driven hydraulic pump of the correct capacity fails to maintain normal system pressure during the operation of a cowl flap actuating unit, the probable cause is
- mechanical interference to the movement of the cowl flap.
  - a partial restriction in the inport of the selector valve.
  - restriction in the pump outlet.\*
835. Hydraulic system thermal relief valves are set to open at a
- lower pressure than the system relief valve.
  - higher pressure than the system relief valve.\*
  - lower pressure than the system pressure regulator.
836. A loud hammering noise in a hydraulic system having an accumulator usually indicates
- air in the fluid.
  - too much preload in the accumulator.
  - too low or no preload in the accumulator.\*
837. How would the air pressure charge in the accumulator be determined if the engine is inoperative, but the system still has hydraulic pressure?
- Read it directly from the main system pressure gauge with all actuators inoperative.
  - Build up system pressure with the emergency pump and then read the pressure on a gauge attached to the air side of the accumulator.
  - Operate a hydraulic unit slowly and note the pressure at which a rapid pressure drop begins as it goes toward zero.\*
838. To check the air charge in a hydraulic accumulator,
- reduce all hydraulic pressure, then observe the reading on the accumulator air gauge.\*
  - observe the first reading on the hydraulic system gauge while operating a component in the system.
  - read it directly from the auxiliary pressure gauge.
839. An emergency supply of fluid is often retained in the main hydraulic system reservoir by the use of a standpipe. The supply line is connected to the
- inlet of the main hydraulic system.
  - inlet of the emergency pump.
  - inlet of the main system pump.\*
840. Hydraulic fluid reservoirs are sometimes designed with a standpipe in one of the outlet ports in order to assure emergency supply of fluid. The outlet port with the standpipe in it furnishes fluid to the
- emergency pump when the fluid supply to the normal system has been depleted.
  - emergency pump at any time it is required.
  - normal system power pump.\*
841. One of the main advantages of skydrol is it's
- wide operating temperature.\*
  - high operating pressure.
  - inability to mix with water.
842. What is the main purpose of a pressurized reservoir in a hydraulic system?
- Prevent tank collapse at altitude.
  - Prevent hydraulic pump cavitation.
  - Prevent hydraulic fluid from foaming.\*

843. Chatter in a hydraulic system is caused by
- excessive system pressure.
  - insufficient system pressure.
  - air in the system.\*
844. Hydraulic fluid filtering elements constructed of porous paper are normally
- cleaned and reused.
  - discarded at regular intervals and replaced with new filtering elements.\*
  - not approved for use in certificated aircraft.
845. Before removing the filler cap of a pressurized hydraulic reservoir,
- relieve the hydraulic system pressure.\*
  - actuate several components in the system.
  - relieve the air pressure.
846. Hydraulic system accumulators serve which of the following functions?
- Dampen pressure surges.
  - Supplement the system pump when demand is beyond the pump's capacity.
  - Store power for limited operation of components if the pump is not operating.
  - Ensure a continuous supply of fluid to the pump.
- 2, 3.
  - 1, 2, 3, 4.
  - 1, 2, 3.\*
847. Chattering of the hydraulic pump during operation is an indication
- of low accumulator preload.
  - that the main system relief valve is sticking open.
  - that air is entering the pump.\*
848. Quick disconnect couplings in hydraulic systems provide a means of
- easily replacing hydraulic lines in areas where leaks are common.
  - quickly connecting and disconnecting hydraulic lines and eliminate the possibility of contaminants entering the system.
  - quickly connecting and disconnecting hydraulic lines without loss of fluid or entrance of air into the system.\*
849. Which seal/material is used with phosphate ester base hydraulic fluids?
- Silicone rubber.
  - Butyl rubber.\*
  - Neoprene rubber.
850. A hydraulic pump is a constant-displacement type if it
- produces an unregulated constant pressure.
  - produces a continuous positive pressure.
  - delivers a uniform rate of fluid flow.\*
851. The purpose of restrictors in hydraulic systems is to
- control the rate of movement of hydraulically operated mechanisms.\*
  - allow the flow of fluid in one direction only.
  - lower the operating pressure of selected components.
852. A crossflow valve which is designed to bypass fluid from one side of an actuating cylinder to the other side, under certain conditions, may be found in some aircraft installed in the
- engine cowl flap system.
  - landing gear system.\*
  - flap overload system.
853. A common cause of slow actuation of hydraulic components is
- cold fluid.
  - restricted orifices.
  - internal leakage in the actuating unit.\*
854. A pilot reports that when the hydraulic pump is running, the pressure is normal. However, when the pump is stopped, no hydraulic pressure is available. This is an indication of a
- leaking selector valve.
  - low accumulator fluid preload.
  - leaking accumulator air valve.\*
855. If fluid is added to a nonpressurized reservoir in a constant pressure hydraulic system while the system is pressurized,
- fluid will spray violently out of the reservoir when the filler neck cap is removed.
  - the fluid level will increase when system pressure is reduced.\*
  - air will be drawn into the system, when the filler neck cap is removed, resulting in pump chattering and possible damage.
856. In a hydraulic system that has a reservoir pressurized with turbine engine compressor bleed air, which unit reduces the air pressure between the engine and reservoir?
- Relief valve.
  - Air bleed relief valve.
  - Air pressure regulator.\*
857. In a typical high pressure pneumatic system, if the moisture separator does not vent accumulated water when the compressor shuts down, a likely cause is a
- saturated chemical dryer.
  - malfunctioning pressure transmitter.
  - malfunctioning solenoid dump valve.\*
858. Teflon hose that has developed a permanent set from being exposed to high pressure or temperature should
- not be straightened or bent further.\*
  - not be reinstalled once removed.
  - be immediately replaced.
859. A worn hydraulic pump shaft seal can normally be detected by
- hydraulic fluid flowing from the pump drain line.\*
  - evidence of hydraulic fluid combined in the engine oil.
  - the presence of hydraulic fluid around the pump mounting pad.

860. A hydraulic motor converts fluid pressure to
- linear motion.
  - rotary motion.\*
  - angular motion.
861. The removal of air from an aircraft hydraulic system is generally accomplished
- through automatic bleed valves on individual components during system operation.
  - by operating the various hydraulic components through several cycles.\*
  - by allowing the system to remain inoperative for several hours.
862. What is one advantage of piston type hydraulic motors over electric motors?
- They are considerably quieter in operation.
  - There is no fire hazard if the motor is stalled.
  - They work satisfactorily over a wider temperature range.\*
863. Extrusion of an O ring seal is prevented in a high pressure system by the use of a
- backup ring on the side of the O ring next to the pressure.
  - U ring on the side of the O ring away from the pressure.
  - backup ring on the side of the O ring away from the pressure.\*
864. The installation of a new metal hydraulic line should be made with
- a straight tube to withstand the shocks and vibration to which it will be subjected.
  - a straight tube to permit proper alignment of the fitting and thereby reduce fluid loss through leakage.
  - enough bends to allow the tube to expand and contract with temperature changes and to absorb vibration.\*
865. If a rigid tube is too short for the flare to reach its seat before tightening, pulling it into place by tightening
- is acceptable.
  - may distort the flare.\*
  - may distort the cone.
866. Which characteristics apply to aircraft hydraulic systems?
- Minimum maintenance requirements.
  - Lightweight.
  - About 80 percent operating efficiency (20 percent loss due to fluid friction).
  - Simple to inspect.
- 1, 2, 3, 4.
  - 1, 3, 4.
  - 1, 2, 4.\*
867. A flexible sealing element subject to motion is a
- compound.
  - packing.\*
  - gasket.
868. The purpose of the pressure regulator in a hydraulic system is to
- maintain system operating pressure within a predetermined range and to unload the pump.\*
  - regulate the amount of fluid flow to the actuating cylinders within the system.
  - prevent failure of components or rupture of hydraulic lines under excessive pressure.
869. What is the purpose of using backup rings with O rings in hydraulic systems above 1,500 PSI?
- Prevent internal and external leakage of all moving parts within a hydraulic system.
  - Provide a seal between two parts of a unit which move in relation to each other.
  - Prevent high pressure from extruding the seal between the moving and stationary part.\*
870. What type of selector valve is one of the most commonly used in hydraulic systems to provide for simultaneous flow of fluid into and out of a connected actuating unit?
- Four port, closed center valve.\*
  - Three port, four way valve.
  - Two port, open center valve.
871. Generally, the first step in removing an accumulator from an aircraft is to
- relieve system pressure.
  - discharge the preload.\*
  - drain the reservoir.
872. Pneumatic systems utilize
- return lines.
  - relief valves.\*
  - diluter valves.
873. One of the distinguishing characteristics of an open center selector valve used in a hydraulic system is that
- fluid flows through the valve in the OFF position.\*
  - fluid flows in three directions in the ON position.
  - a limited amount of fluid flows in one direction and no fluid flows in the opposite direction.
874. The aircraft pneumatic system, which incorporates an engine driven multistage reciprocating compressor, also requires
- an oil separator.
  - a surge chamber.
  - a moisture separator.\*
875. Relief valves are used in pneumatic systems
- for one direction flow control.
  - to reduce the rate of airflow.
  - as damage preventing units.\*
876. What type of packings should be used in hydraulic components to be installed in a system containing Skydrol?
- AN packings made of natural rubber.
  - Packing materials made for ester base fluids.\*
  - AN packings made of neoprene.

877. The hydraulic component that automatically directs fluid from either the normal source or an emergency source to an actuating cylinder is called a
- bypass valve.
  - shuttle valve.\*
  - crossflow valve.
878. (1). Relief valves are used in pneumatic systems as damage preventing units. (2) Check valves are used in both hydraulic and pneumatic systems. Regarding the above statements,
- both No. 1 and No. 2 are true.\*
  - neither No. 1 nor No. 2 is true.
  - only No. 1 is true.
879. Three types of hydraulic fluids currently being used in civil aircraft are
- mineral base, vegetable base, and phosphate ester base.\*
  - mineral base, phosphate ester base, and mixed mineral and phosphate ester base.
  - mineral base, phosphate ester base, and mixed vegetable and alcohol base.
880. Select or valve used in a hydraulic system that directs pressurized fluid to one end of an actuating cylinder and simultaneously directs return fluid to the reservoir from the other end.
- Sequence.
  - Shuttle.
  - Selector.\*
881. Which allows free fluid flow in one direction and no fluid flow in the other direction?
- Check valve.\*
  - Metering piston.
  - Shutoff valve.
882. To prevent external and internal leakage in aircraft hydraulic units, the most commonly used type of seal is the
- O ring seal.\*
  - gasket seal.
  - chevron seal.
883. To protect packing rings or seals from damage when it is necessary to install them over or inside threaded sections, the
- threaded section should be coated with a heavy grease.
  - packings should be stretched during installation to avoid contact with the threads.
  - threaded section should be covered with a suitable sleeve.\*
884. The component in the hydraulic system that is used to direct the flow of fluid is the
- check valve.
  - orifice check valve.
  - selector valve.\*
885. Characteristics of MIL-H-5606 hydraulic fluid are
- light purple color, phosphate ester base, fire resistant, butyl rubber seals.
  - blue color, vegetable base, will burn, natural rubber seals.
  - red color, petroleum base, will burn, synthetic rubber seals.\*
886. What function does the absolute pressure regulator perform in the pneumatic power system?
- Regulates the compressor outlet air pressure to stabilize the system pressure.\*
  - Regulates the pneumatic system pressure to protect the moisture separator from internal explosion.
  - Regulates the compressor inlet air to provide a stabilized source of air for the compressor.
887. (1) Materials which are Skydrol compatible and resistant include most common aircraft metals and polyurethane and epoxy paints respectively.(2) Skydrol hydraulic fluid is compatible with nylon and natural fibers.Regarding the above statements,
- neither No. 1 nor No. 2 is true.
  - both No. 1 and No. 2 are true.
  - only No. 1 is true.\*
888. Phosphate ester base hydraulic fluid is very susceptible to contamination from
- teflon seal material.
  - water in the atmosphere.\*
  - ethylene propylene elastomers.
889. How can the proper hydraulic fluid to be used in an airplane be determined?
- Refer to the aircraft parts manual.
  - Consult the aircraft Type Certificate Data Sheet.
  - Consult the aircraft manufacturer's service manual\*
890. Components containing phosphate ester-base hydraulic fluid may be cleaned with
- Carbon tetrachloride.\*
  - Naphtha.
  - Stoddard solvent.
891. What is used to flush a system normally serviced with MIL-H-5606 hydraulic fluid?
- Methyl ethyl ketone or kerosene.
  - Naphtha or varsol.\*
  - Lacquer thinner or trichlorethylene.
892. Characteristics of MIL-H-7644 hydraulic fluid are
- red color, petroleum base, will burn, synthetic rubber seals.
  - light purple color, phosphate ester base, fire resistant, butyl rubber seals.
  - blue color, vegetable base, will burn, natural rubber seals.\*

893. Where can information be obtained about the compatibility of fire resistant hydraulic fluid with aircraft materials?
- Manufacturer's technical bulletins.\*
  - Aircraft manufacturer's specifications.
  - AC 43.13-1A.
894. Characteristics of MIL-H-8446 (Skydrol 500 A & B) hydraulic fluid are
- blue color, phosphate ester base, fire resistant, butyl rubber seals.
  - light purple color, phosphate ester base, fire resistant, butyl rubber seals.\*
  - light green color, phosphate ester base, fire resistant, butyl rubber seals.
895. Which of the following lists only desirable properties of a good hydraulic fluid?
- High viscosity, low flash point, chemical stability, high fire point.
  - High flash point, low viscosity, chemical stability, low fire point.
  - Low viscosity, chemical stability, high flash point, high fire point.\*
896. What is the viscosity of hydraulic fluid?
- The increase in volume of a fluid due to temperature change.
  - The fluid's ability to resist oxidation and deterioration for long period.
  - The internal resistance of a fluid which tends to prevent it from flowing.\*
897. If a hydraulic brake system uses neoprene rubber packing materials, the correct hydraulic fluid to service the system is
- mineral base oil.\*
  - vegetable base oil.
  - phosphate ester base oil.
898. If an aircraft hydraulic system requires mineral base hydraulic fluid, but phosphate ester base hydraulic fluid is used, what will be the effect on the system?
- No effect.
  - System will be contaminated, fluids will not blend, and the seals will fail.\*
  - System will be contaminated, fluids will not blend, but there will be no seal problem.
899. The internal resistance of a fluid which tends to prevent it from flowing is called
- volatility.
  - viscosity.\*
  - acidity.
900. Which is a characteristic of petroleum base hydraulic fluid?
- Flammable under normal conditions.\*
  - Compatible to natural rubber seals and packings.
  - Nonflammable under all conditions.
901. (1) When servicing aircraft hydraulic systems, use the type fluid specified in the aircraft manufacturer's maintenance manual or on the instruction plate affixed to the reservoir or unit. (2) Hydraulic fluids for aircraft are dyed a specific color for each type of fluid. Regarding the above statements,
- only No. 1 is true.
  - only No. 2 is true.
  - both No. 1 and No. 2 are true.\*
902. Petroleum base hydraulic fluid is which color?
- Purple.
  - Blue.
  - Red.\*
903. Which of the following is adversely affected by atmospheric humidity if left unprotected?
- MIL-H-5606 hydraulic fluid.
  - Skydrol hydraulic fluid.
  - None of the above.
- 1 and 2.\*
  - 3.
  - 2.
904. Which statement about fluids is correct?
- Any fluid will completely fill its container.
  - All fluids are considered to be highly compressible.
  - All fluids readily transmit pressure.\*
905. What test is used to determine the serviceability of an oxygen cylinder?
- Pressure test with manometer.
  - Pressure test with nitrogen.
  - Pressure test with water.\*
906. The purpose of the dump valve in a pressurized aircraft is to relieve
- all positive pressure from the cabin.\*
  - a negative pressure differential.
  - pressure in excess of the maximum differential.
907. What component might possibly be damaged if liquid refrigerant is introduced into the low side of a vapor cycle cooling system when the pressure is too high or the outside air temperature is too low?
- Compressor.\*
  - Condenser.
  - Evaporator.
908. How can it be determined that a vapor cycle cooling system is charged with the proper amount of freon?
- Air bubbles in the sight glass disappear.\*
  - The compressor loads up and RPM decreases.
  - Air bubbles appear in the sight glass.
909. When charging a vapor cycle cooling system after evacuation, the low pressure gauge fails to come out of a vacuum. What is indicated?
- Blockage in the system.\*
  - The expansion valve failed to close.
  - The compressor is not engaging.

910. The basic air cycle cooling system consists of
- a source of compressed air, heat exchangers, and turbine.\*
  - heaters, coolers, and compressors.
  - ram air source, compressors, and engine bleeds.
911. Frost or ice buildup on a vapor cycle cooling system evaporator would most likely be caused by
- the mixing valve sticking closed.
  - moisture in the evaporator.
  - inadequate airflow through the evaporator.\*
912. In a freon vapor cycle cooling system, where is cooling air obtained for the condenser?
- Turbine engine compressor.
  - Ambient air.\*
  - Pressurized cabin air.
913. What component in a vapor cycle cooling system would most likely be at fault if a system would not take a freon charge?
- Expansion valve.\*
  - Condenser.
  - Receiver dryer.
914. What controls the operation of the cabin pressure regulator?
- Cabin altitude.\*
  - Bleed air pressure.
  - Compression air pressure.
915. The cabin pressure of an aircraft in flight is maintained at the selected altitude by
- controlling the air inflow rate.
  - inflating door seals and recirculating conditioned cabin air.
  - controlling the rate at which air leaves the cabin.\*
916. In the combustion heater, combustion air system, what prevents too much air from entering the heaters as air pressure increases?
- Either a combustion air relief valve or a differential pressure regulator.\*
  - Only a differential pressure regulator can be used.
  - Only a combustion air relief valve can be used.
917. What is ventilating air used for on a combustion heater?
- Provides combustion air for ground blower.
  - Carries heat to the places where needed.\*
  - Provides air required to support the flame.
918. At which component in an air cycle cooling system does air undergo a pressure and temperature drop?
- Expansion turbine.\*
  - Primary heat exchanger.
  - Refrigeration bypass valve.
919. Which section of a turbine engine provides high pressure bleed air to an air cycle machine for pressurization and air-conditioning?
- Turbine compressor.\*
  - Inlet compressor.
  - C-D inlet compressor duct.
920. Composite oxygen bottles that conform to DOT-E-8162 have a service life of
- 5 years or 5000 filling cycles whichever occurs first.
  - 10 years or 5000 filling cycles whichever occurs first.
  - 15 years or 10 000 filling cycles whichever occurs first.\*
921. How often should standard weight high pressure oxygen cylinders be hydrostatically tested?
- Every 5 years.\*
  - Every 4 years.
  - Every 3 years.
922. Turbine engine air used for air conditioning and pressurization is generally called
- compressed air.
  - ram air.
  - bleed air.\*
923. The expansion valve are essentially the same temperature, what does this indicate?
- The system is functioning normally.
  - The expansion valve is not metering freon properly \*
  - The compressor is pumping too much refrigerant
924. In the diluter demand oxygen regulator, when does the demand valve operate?
- When the diluter control is set at normal.
  - When the user demands 100 percent oxygen.
  - When the user breathes.\*
925. What controls the amount of oxygen delivered to a mask in a continuous flow oxygen system?
- Calibrated orifice.\*
  - Pressure reducing valve.
  - Pilot's regulator.
926. If oxygen bottle pressure is allowed to drop below a specified minimum, it may cause
- the pressure reducer to fail.
  - the automatic altitude control valve to open.
  - moisture to collect in the bottle.\*
927. When an aircraft's oxygen system has developed a leak, the lines and fittings should be
- removed and replaced.
  - inspected using a special oxygen system dye penetrant.
  - bubble tested with a special soap solution manufactured specifically for this purpose.\*
928. What type of oil is suitable for use in vapor-cycle cooling system?
- Low viscosity engine oil with the inability to absorb water.
  - Special high grade refrigeration oil.\*
  - Highly refined synthetic oil, free from impurities with special water absorbing additives.

929. When Refrigerant 12 is passed over an open flame, it
- changes to methane gas.
  - is broken down into its basic chemical elements.
  - changes to phosgene gas.\*
930. What is the condition of the refrigerant as it enters the evaporator of a vapor cycle cooling system?
- High pressure liquid.
  - Low pressure liquid.\*
  - High pressure vapor.
931. The purpose of a subcooler in a vapor cycle cooling system is to
- augment the cooling capacity during periods of peak demand.
  - aid in quick cooling a hot aircraft interior.
  - cool the freon to prevent premature vaporization.\*
932. In a high-pressure oxygen system, if the pressure reducer fails, what prevents high pressure oxygen from entering the system downstream?
- Check valve.
  - Pressure relief valve.\*
  - Manifold control valve.
933. When a vapor cycle cooling system is not in operation, what is an indication that the system is leaking freon?
- Oil seepage.\*
  - Bubbles in the sight glass.
  - An ozone-like odor in the immediate area.
934. When purging a freon air conditioning system, it is important to release the charge at a slow rate. What is the reason for the slow rate discharge?
- Prevent the large amount of freon from contaminating the surrounding atmosphere.
  - Prevent excessive loss of refrigerant oil.\*
  - Prevent condensation from forming and contaminating the system.
935. In what position should the bottle be placed when adding liquid freon to a vapor cycle cooling system?
- Vertical with the outlet at the top.\*
  - Horizontal with the outlet to the side.
  - Vertical with the outlet at the bottom.
936. What is the condition of the refrigerant as it leaves the condenser of a vapor cycle cooling system?
- Low pressure liquid.
  - High pressure liquid.\*
  - High pressure vapor.
937. What is the condition of the refrigerant as it leaves the evaporator of a vapor cycle cooling system?
- Low pressure liquid.
  - Low pressure vapor.\*
  - High pressure vapor.
938. The evacuation of a vapor-cycle cooling system removes any water that may be present by
- drawing out the liquid.
  - raising the boiling point of the water and drawing out the vapor.
  - lowering the boiling point of the water and drawing out the vapor.\*
939. (1) A small amount of water in a vapor cycle cooling system can freeze in the receiver-dryer and stop the entire system operation.(2) Water in a vapor cycle cooling system will react with refrigerant to form hydrochloric acid which is highly corrosive to the metal in the system. Regarding the above statements,
- only No. 1 is true.
  - only No. 2 is true.\*
  - both No. 1 and No. 2 are true.
940. Oxygen systems in unpressurized aircraft are generally of the
- continuous flow and pressure demand types.\*
  - pressure demand type only.
  - portable bottle type only.
941. Which of the following are characteristic of a chemical or solid state oxygen system?
- An adjustable oxygen release rate.
  - A volume storage capacity about three times that of compressed oxygen.
  - The system generators are inert below 400 °F even under severe impact.
  - A distribution and regulating system similar to gaseous oxygen systems.
- 2 & 3.\*
  - 3 & 4.
  - 1 & 2.
942. On transport category aircraft what might be an indication of an over pressure event of the aircraft oxygen system?
- The green thermal expansion disk missing.\*
  - The green thermal expansion disk in the cockpit missing.
  - The green thermal expansion disk on the oxygen regulator missing.
943. An aircraft pressurization cycle is normally considered to be
- one complete series of events or operations that recur regularly.\*
  - one take off and one landing.
  - when the fuselage reaches its maximum pressure differential one time.
944. How should you determine the amount of oxygen in a portable, high pressure cylinder?
- Weigh the cylinder and its contents.
  - Read the pressure gauge mounted on the cylinder\*.
  - Measure the pressure at the mask.
945. To be eligible for recharging, a DOT 3HT oxygen cylinder must have been hydrostatically tested every three years and be retired from service after
- 24 years or 4380 filling cycles.\*
  - 15 years or 10 000 filling cycles.
  - 10 years or 5000 filling cycles.



946. Before a high pressure oxygen cylinder is serviced, it must be the correct type and have been
- hydrostatically tested within the proper time interval.\*
  - approved by the National Transportation Safety Board.
  - inspected by a certificated airframe mechanic.
947. The primary difference between aviation breathing oxygen and most other types of commercially available compressed oxygen is that
- the other types are usually somewhat less than 99.5 percent pure oxygen.
  - aviation breathing oxygen has had all the water vapor removed.\*
  - aviation breathing oxygen has a higher percentage of water vapor to help prevent drying of a person's breathing passages and possible dehydration.
948. The purpose of the airflow metering aneroid assembly found in oxygen diluter demand regulators is to
- regulate airflow in relation to oxygen flow when operating in emergency or diluter demand positions.
  - regulate airflow in relation to cabin altitude when in diluter demand position.\*
  - automatically put the regulator in emergency position if the demand valve diaphragm ruptures.
949. What is used in some oxygen systems to change high cylinder pressure to low system pressure?
- Pressure reducer valve.\*
  - Calibrated fixed orifice.
  - Diluter demand regulator.
950. (1) Oxygen used in aircraft systems is at least 99.5 percent pure and is practically water free. (2) Oxygen used in aircraft systems is 99.5 percent pure and is hospital quality. Regarding the above statements,
- only No. 1 is true.\*
  - both No. 1 and No. 2 are true.
  - neither No. 1 nor No. 2 is true.
951. The purpose of pressurizing aircraft cabins is to ( 1 ) create the proper environment for prevention of hypoxia. (2) permit operation at high altitudes. Regarding the above statements,
- only No. 1 is true.
  - only No. 2 is true.
  - both No. 1 and No. 2 are true.\*
952. In a gaseous oxygen system, which of the following are vented to blow out plugs in the fuselage skin?
- Pressure relief valves.\*
  - Filler shutoff valves.
  - Pressure reducer valves.
953. An aircraft oxygen bottle may be considered airworthy if it has been hydrostatically tested and identified
- with the test date, DOT number and serial number stamped on the cylinder near the neck.\*
  - with the DOT number, serial number and manufacturer stamped on the cylinder near the neck.
  - with the DOT number and manufacturer stamped on the cylinder near the neck.
954. High pressure cylinders containing oxygen for aviation use can be identified by their
- green color and the words 'BREATHING OXYGEN' stenciled in 1-inch white letters.
  - yellow color and the words 'AVIATOR'S BREATHING OXYGEN' stenciled in 1-inch white letters.
  - green color and the words 'AVIATOR'S BREATHING OXYGEN' stenciled in 1-inch white letters.\*
955. A contaminated oxygen system is normally purged with
- oxygen.\*
  - compressed air.
  - nitrogen.
956. If a high pressure oxygen cylinder is to be installed in an airplane, it must meet the specifications of the
- aircraft manufacturer or the cylinder manufacturer.
  - Department of Transportation.\*
  - National Transportation Safety Board or the Standards of Compressed Gas Cylinders.
957. The point at which freon flowing through a vapor cycle cooling system absorbs heat and changes from a liquid to a gas is the
- condenser.
  - evaporator.\*
  - expansion valve.
958. If the liquid level gauge in a vapor cycle cooling system indicates a low freon charge, the system should
- be operated and a pressure check performed.
  - be operated for a period of time to reach a stable condition and then the freon level rechecked.\*
  - not be operated until freon and oil have been added.
959. What component of a pressurization system prevents the cabin altitude from becoming higher than airplane altitude?
- Cabin rate of descent control.
  - Negative pressure relief valve.\*
  - Positive pressure relief valve.
960. What is the purpose of a mixing valve in a compressor bleed air air-conditioning system?
- Control the supply of hot, cool, and cold air.\*
  - Distribute conditioned air evenly to all parts of the cabin.
  - Combine ram air with conditioned air.

961. The function of the evaporator in a freon cooling system is to
- liquefy freon in the line between the compressor and the condenser.
  - lower the temperature of the cabin air.\*
  - transfer heat from the freon gas to ambient air.
962. The cabin pressure control setting has a direct influence upon the
- outflow valve opening.\*
  - pneumatic system pressure.
  - inflow valve opening.
963. On some cabin pressurization systems, pressurization on the ground is restricted by the
- cabin pressure regulator.
  - negative pressure-relief valve.
  - main landing gear operated switch.\*
964. If the cabin rate of climb is too great, the control should be adjusted to cause the
- outflow valve to close slower.\*
  - outflow valve to close faster.
  - cabin compressor speed to decrease.
965. How is the cabin pressure of a pressurized aircraft usually controlled?
- By a pressure sensitive switch that causes the pressurization pump to turn on or off as required.
  - By an automatic outflow valve that dumps all the pressure in excess of the amount for which it is set.\*
  - By a pressure sensitive valve that controls the output pressure of the pressurization pump.
966. Hot compressor bleed air operates the conditioned air system on some turbine aircraft, how is cold air supplied?
- By the air cycle machine turbine.\*
  - By the flow control unit.
  - By the ram cycle cooling unit.
967. The point at which freon flowing through a vapor cycle cooling system gives up heat and changes from a gas to a liquid is the
- condenser.\*
  - evaporator.
  - expansion valve.
968. Where does the last stage of cooling in an air cycle air conditioning system occur?
- Refrigeration unit compressor.
  - Secondary heat exchanger.
  - Expansion turbine.\*
969. The main cause of contamination in gaseous oxygen systems is
- moisture.\*
  - dust and other airborne particulates.
  - other atmospheric gases.
970. For use in pressurized aircraft, which is generally the least complicated and requires the least maintenance?
- Chemical oxygen generator systems.\*
  - High-pressure oxygen systems.
  - Low-pressure oxygen systems.
971. The altitude controller maintains cabin altitude by modulation of the
- safety and outflow valves.
  - safety valve.
  - outflow valve.\*
972. What is the condition of the refrigerant as it enters the condenser of a vapor cycle cooling system?
- High pressure liquid.
  - Low pressure liquid.
  - High pressure vapor.\*
973. What may be used as a lubricant on oxygen system tapered pipe thread connections?
- Silicone dielectric compound.
  - Glycerine.
  - Teflon tape.\*
974. Which is considered a good practice concerning the inspection of heating and exhaust systems of aircraft utilizing a jacket around the engine exhaust as a heat source?
- Supplement physical inspections with periodic operational carbon monoxide detection tests.\*
  - All exhaust system components should be removed periodically, and their condition determined by the magnetic particle inspection method.
  - All exhaust system components should be removed and replaced at each 100-hour inspection period.
975. When checking a freon system, a steady stream of bubbles in the sight gauge indicates the charge is
- high.
  - correct.
  - low.\*
976. What type of oxygen system uses the rebreather bag-type mask?
- Diluter demand.
  - Continuous flow.\*
  - Demand.
977. What unit in a vapor cycle cooling system serves as a reservoir for the refrigerant?
- Receiver dryer.\*
  - Evaporator.
  - Condenser.
978. A pressurization controller uses
- bleed air pressure, outside air temperature, and cabin rate of climb.
  - barometric pressure, cabin altitude, and cabin rate of change.\*
  - cabin rate of climb, bleed air volume, and cabin pressure.

979. The position of the thermostatic expansion valve in a vapor cycle cooling system is determined by temperature and pressure of the
- freon entering the evaporator.
  - air in the outlet of the condenser.
  - freon in the outlet of the evaporator.\*
980. Which best describes cabin differential pressure?
- Difference between cabin flight altitude pressure and Mean Sea Level pressure.
  - Difference between the ambient and internal air pressure.\*
  - Difference between cabin pressure controller setting and actual cabin pressure.
981. (1) Usually bleed air from a gas-turbine engine compressor can be safely used for cabin pressurization. (2) Independent cabin condition air machines (air cycle machine. can be powered by bleed air from an aircraft turbine engine compressor) Regarding the above statements,
- only No. 1 is true.      b. only No. 2 is true.
  - both No. 1 and No. 2 are true.\*
982. The air cycle cooling system produces cold air by
- extracting heat energy across a compressor.
  - passing air through cooling coils that contain a refrigerant.
  - extracting heat energy across an expansion turbine \*
983. The operation of an aircraft combustion heater is usually controlled by a thermostat circuit which
- alternately turns the fuel on and off, a process known as cycling.\*
  - meters the amount of fuel continuously entering the heater and therefore regulates the heater's BTU output.
  - regulates the voltage applied to the heater's ignition transformer.
984. After cleaning or replacing the filtering element in a combustion heater fuel system, the system should be pressurized and
- all connections checked for leaks.\*
  - the fuel filter bypass valve reset to the filter position.
  - a sample of fuel taken downstream from the filter to ensure proper operation of the new filtering element.
985. One purpose of a jet pump in a pressurization and air conditioning system is to
- produce a high pressure for operation of the outflow valve.
  - provide for augmentation of airflow in some areas of the aircraft.\*
  - assist in the circulation of freon.
986. The primary function of the cabin pressurization system outflow valve is to
- provide protection against overpressurization.
  - maintain the desired cabin pressure.\*
  - maintain the same cabin air pressure at all altitudes.
987. When servicing an air conditioning system that has lost all of its freon, it is necessary to
- check oil and add as necessary, evacuate the system, relieve vacuum, and add freon.
  - check oil and add as necessary, evacuate the system, and add freon.\*
  - check oil and add as necessary, and add freon.
988. Which prevents a sudden loss of pressurization in the event that there is a loss of the pressurization source?
- Firewall shutoff valve.
  - Cabin pressure outflow valve.
  - Delivery air duct check valve.\*
989. The function of an expansion valve in a freon cooling system is to act as a metering device and to
- reduce the pressure of the gaseous freon.
  - increase the pressure of the liquid freon.
  - reduce the pressure of the liquid freon.\*
990. The function of the condenser in a freon cooling system is to
- transfer heat from the freon gas to ambient air.\*
  - change liquid freon into a gas before it enters the compressor.
  - transfer heat from the cabin air to the liquid freon.
991. The cabin pressurization modes of operation are
- isobaric, differential, and maximum differential.
  - differential, unpressurized, and isobaric.\*
  - ambient, unpressurized, and isobaric.
992. The method of mounting aircraft instruments in their respective panels depends on the
- instrument manufacturer.
  - design of the instrument case.\*
  - design of the instrument panel.
993. Aircraft instrument panels are generally shock mounted to absorb
- all vibration.
  - low frequency, high amplitude shocks.\*
  - high frequency, high amplitude shocks.
994. Aircraft instruments should be marked and graduated in accordance with
- the instrument manufacturer's specifications.
  - both the aircraft and engine manufacturers' specifications.\*
  - the specific aircraft maintenance or flight manual.
995. What marking color is used to indicate if a cover glass has slipped?
- Red.
  - White.\*
  - Yellow.

996. What must be done to an instrument panel that is supported by shock mounts?
- Bonding straps must be installed across the instrument mounts as a current path.\*
  - The instrument mounts must be grounded to the aircraft structure as a current path.
  - The instrument mounts must be tightened to the specified torque required by the maintenance manual.
997. The green arc on an aircraft temperature gauge indicates
- the instrument is not calibrated.
  - the desirable temperature range.\*
  - a low, unsafe temperature range.
998. How would an airspeed indicator be marked to show the best rate of climb speed (one engine inoperative)?
- red radial line.
  - A blue radial line.\*
  - A green arc.
999. How many of the following instruments will normally have range markings?
- Airspeed indicator.
  - Altimeter.
  - Cylinder head temperature gauge.
- One.
  - Two.\*
  - Three.
1000. Which instruments are connected to an aircraft's pitot static system?
- Vertical speed indicator.
  - Cabin altimeter.
  - Altimeter.
  - Cabin rate-of-change indicator.
  - Airspeed indicator.
- 1, 2, 3, 4, and 5.
  - 1, 2, and 4.
  - 1, 3, and 5.\*
1001. Which procedure should you use if you find a vacuum operated instrument glass loose?
- Mark the case and glass with a slippage mark.
  - Replace the glass.
  - Install another instrument.\*
1002. Instrument panel shock mounts absorb
- high energy impact shocks caused by hard landings.
  - low frequency, high-amplitude shocks.\*
  - high G shock loads imposed by turbulent air.
1003. Resistance-type temperature indicators using Wheatstone bridge or ratiometer circuits may be used to indicate the temperatures of which of the following?
- Free air.
  - Exhaust gas temperature.
  - Carburetor air.
  - Coolant (engine).
  - Oil temperature.
  - Cylinder head temperature.
- 1, 2, 3, 4, 5, and 6.
  - 1, 3, 4, and 5.\*
  - 1, 2, 3, and 6.
1004. An aircraft instrument panel is electrically bonded to the aircraft structure to
- act as a restraint strap.
  - provide current return paths.\*
  - aid in the panel installation.
1005. A radar altimeter indicates
- flight level (pressure altitude).
  - altitude above sea level.
  - altitude above ground level.\*
1006. When flags such as NAV, HDG, or GS are displayed on an HSI, the indication is
- that function is inoperative.\*
  - that function is operating.
  - to call attention to deviation from the desired setting, or flight path, or heading, etc.
1007. How is a flangeless instrument case mounted in an instrument panel?
- By four machine screws which extend through the instrument panel.
  - By an expanding type clamp secured to the back of the panel and tightened by a screw from the front of the instrument panel.\*
  - By a metal shelf separate from and located behind the instrument panel.
1008. Cases for electrically operated instruments are made of
- Iron or steel cases.
  - Plastic or composite cases.
  - Aluminum or bakelite cases.\*
1009. When installing an instrument in an aircraft, who is responsible for making sure it is properly marked?
- The aircraft owner.\*
  - The instrument installer.
  - The instrument manufacturer.
1010. Where may a person look for the information necessary to determine the required markings on an engine instrument?
- Engine manufacturer's specifications.
  - Aircraft flight manual.
  - Instrument manufacturer's specifications.
  - Aircraft maintenance manual.
- 2 or 4.
  - 1 or 4.\*
  - 2 or 3.
1011. A certificated mechanic with airframe and powerplant ratings may
- perform minor repairs to aircraft instruments.
  - perform minor repairs and minor alterations to aircraft instruments.
  - not perform repairs to aircraft instruments.\*
1012. A certificated mechanic may perform
- minor repairs to instruments.
  - 100-hour inspections of instruments.\*
  - instrument overhaul.

1013. How many of the following are controlled by gyroscopes?
1. Attitude indicator.
  2. Heading indicator.
  3. Turn needle of the turn and slip indicator.
- a. Three.\*
  - b. Two.
  - c. One.
1014. The lubber line on a directional gyro is used to
- a. represent the nose of the aircraft.\*
  - b. align the instrument glass in the case.
  - c. represent the wings of the aircraft.
1015. Which instruments are connected to an aircraft's static pressure system only?
1. Vertical speed indicator.
  2. Cabin altimeter.
  3. Altimeter.
  4. Cabin rate-of-change indicator.
  5. Airspeed indicator.
- a. 1 and 3.\*
  - b. 2, 4, and 5.
  - c. 2 and 4.
1016. When an unpressurized aircraft's static pressure system is leak checked to comply with the requirements of Section 91.411, what aircraft instrument may be used in lieu of a pitot-static system tester?
1. Vertical speed indicator.
  2. Cabin altimeter.
  3. Altimeter.
  4. Cabin rate-of-change indicator.
  5. Airspeed indicator.
- a. 1 or 5.
  - b. 2 or 4.
  - c. 3.\*
1017. If a static pressure system check reveals excessive leakage, the leak(s) may be located by
- a. pressurizing the system and adding leak detection dye.
  - b. isolating portions of the line and testing each portion systematically, starting at the instrument connections.\*
  - c. removing and visually inspecting the line segments.
1018. When performing the static system leakage check required by Section 91.411, the technician utilizes
- a. static pressure.\*
  - b. positive pressure.
  - c. negative pressure.
1019. A radar altimeter determines altitude by
- a. transmitting a signal and receiving back a reflected signal.\*
  - b. receiving signals transmitted from ground radar stations.
  - c. means of transponder interrogation.
1020. Which of the following instrument discrepancies would require replacement of the instrument?
1. Red line missing.
  2. Case leaking.
  3. Glass cracked.
  4. Mounting screws loose.
  5. Case paint chipped.
  6. Leaking at line B nut.
  7. Will not zero out.
  8. Fogged.
- a. 2, 3, 7, 8.\*
  - b. 1, 4, 6, 7.
  - c. 1, 3, 5, 8.
1021. The red radial lines on the face of an engine oil pressure gauge indicates
- a. minimum engine safe RPM operating range.
  - b. minimum precautionary safe operating range.
  - c. minimum and/ or maximum safe operating limits.\*
1022. A Bourdon tube instrument may be used to indicate
1. pressure.
  2. temperature.
  3. position.
- a. 1 and 2.
  - b. 1.\*
  - c. 2 and 3.
1023. An aircraft magnetic compass is swung to up-date the compass correction card when
- a. an annual inspection is accomplished on the aircraft.
  - b. the compass is serviced.
  - c. equipment is added that could effect compass deviation.\*
1024. The operating mechanism of most hydraulic pressure gauges is
- a. Bourdon tube.\*
  - b. an airtight diaphragm.
  - c. an evacuated bellows filled with an inert gas to which suitable arms, levers, and gears are attached.
1025. What is the fixed line mark attached to the compass bowl of a magnetic compass called?
- a. Reeder line.
  - b. Lubber line.\*
  - c. Reference line.
1026. (1) Aircraft instruments are color-coded to direct attention to operational ranges and limitations. ( 2 ) Aircraft instruments range markings are not specified by Title 14 of the Code of Federal Regulations but are standardized by aircraft manufacturers. Regarding the above statements,
- a. only No. 1 is true.\*
  - b. only No. 2 is true.
  - c. both No. 1 and No. 2 are true.

1027. When swinging a magnetic compass, the compensators are adjusted to correct for
- magnetic influence deviation.\*
  - compass card oscillations.
  - magnetic variations.
1028. What will be the result if the instrument static pressure line becomes disconnected inside a pressurized cabin during cruising flight?
- The altimeter and airspeed indicator will both read low.\*
  - The altimeter and airspeed indicator will both read high.
  - The altimeter will read low and the airspeed indicator will read high.
1029. The maximum deviation (during level flight) permitted in a compensated magnetic direction indicator installed on an aircraft certificated under Federal Aviation Regulation Part 23 is
- 6.
  - 8.
  - 10.\*
1030. Magnetic compass bowls are filled with a liquid to
- retard precession of the float.
  - reduce deviation errors.
  - dampen the oscillation of the float.\*
1031. Instrument static system leakage can be detected by observing the rate of change in indication of the
- airspeed indicator after suction has been applied to the static system to cause a prescribed equivalent airspeed to be indicated.
  - altimeter after pressure has been applied to the static system to cause a prescribed equivalent altitude to be indicated.
  - altimeter after suction has been applied to the static system to cause a prescribed equivalent altitude to be indicated.\*
1032. The maximum altitude loss permitted during an unpressurized aircraft instrument static pressure system integrity check is
- 50 feet in 1 minute.
  - 200 feet in 1 minute.\*
  - 300 feet in 1 minute.
1033. Which statement regarding an aircraft instrument vacuum system is true?
- Dry type vacuum pumps with carbon vanes are very susceptible to damage from solid airborne particles and must take in only filtered air.
  - Vacuum systems are generally more effective at high altitudes than positive pressure systems.
  - If the air inlet to each vacuum instrument is connected to a common atmospheric pressure manifold, the system generally will be equipped with individual instrument filters only.\*
1034. When an aircraft altimeter is set at 29.92 inches Hg on the ground, the altimeter will read
- pressure altitude.
  - density altitude.
  - field elevation.\*
1035. A barometric altimeter indicates pressure altitude when the barometric scale is set at
- 29.92 inches Hg.\*
  - 14.7 inches Hg.
  - field elevation.
1036. Which of the following instrument conditions is acceptable and would not require correction?
- Red line missing.
  - Case leaking.
  - Glass cracked.
  - Mounting screws loose.
  - Case paint chipped.
  - Leaking at line B nut.
  - Will not zero out.
  - Fogged.
- 1.
  - 5.\*
  - None.
1037. Which of the following causes of aircraft magnetic compass inaccuracies may be compensated for by mechanics?
- Deviation.\*
  - Magnetic compass current.
  - Variation
1038. The function of a symbol generator (SG) in an EFIS is to
- display alphanumeric data and representations of aircraft instruments.
  - allow the pilot to select the appropriate system configuration for the current flight situation.
  - receive and process input signals from aircraft and engine sensors and send the data to the appropriate display.\*
1039. The function of a CRT in an EFIS is to
- allow the pilot to select the appropriate system configuration for the current flight situation.
  - display alphanumeric data and representations of aircraft instruments.\*
  - receive and process input signals from aircraft and engine sensors and send the data to the appropriate display.
1040. Data transmitted between components in an EFIS are converted into
- digital signals.\*
  - analog signals.
  - carrier wave signals.
1041. Which condition would be most likely to cause excessive vacuum in a vacuum system?
- Vacuum pump overspeed.
  - Vacuum relief valve improperly adjusted.\*
  - Vacuum relief valve spring weak.

1042. The requirements for testing and inspection of instrument static systems required by Section 91.411 are contained in
- Type Certificate Data Sheets.
  - AC 43.13-1A.
  - Part 43, appendix E.\*
1043. Which of the following instrument discrepancies could be corrected by an aviation mechanic?
- Red line missing.
  - Case leaking.
  - Glass cracked.
  - Mounting screws loose.
  - Case paint chipped.
  - Leaking at line B nut.
  - Will not adjust.
  - Fogged.
- 1, 4, 6.\*
  - 3, 4, 5, 6.
  - 1, 4, 5, 6.
1044. Who is authorized to repair an aircraft instrument?
- A certified mechanic with an airframe rating.
  - A certificated repairman with an airframe rating.
  - A certificated repair station approved for that class instrument.
  - A certificated airframe repair station.
- 1, 2, 3, and 4.
  - 3 and 4.
  - 3.\*
1045. The function of a display controller in an EFIS is to
- display alphanumeric data and representations of aircraft instruments.\*
  - allow the pilot to select the appropriate system configuration for the current flight situation.
  - receive and process input signals from aircraft and engine sensors and send the data to the appropriate display.
1046. Fuel flow transmitters are designed to transmit data
- mechanically.
  - electrically.\*
  - utilizing fluid power.
1047. Turbine engine exhaust gas temperatures are measured by using
- iron/constantan thermocouples.
  - chromel/alumel thermocouples.\*
  - ratiometer electrical resistance thermometers.
1048. The operation of an angle of attack indicating system is based on detection of differential pressure at a point where the airstream flows in direction
- not parallel to the true angle of attack of the aircraft.
  - parallel to the angle of attack of the aircraft.
  - parallel to the longitudinal axis of the aircraft.\*
1049. A synchro transmitter is connected to a synchro receiver
- mechanically through linkage.
  - electromagnetically without wires.
  - electrically with wires.\*
1050. Thermocouple leads
- are designed for a specific installation and may not be altered.\*
  - may be installed with either lead to either post of the indicator.
  - may be repaired using solderless connectors.
1051. A turn coordinator instrument indicates
- the longitudinal attitude of the aircraft during climb and descent.
  - both roll and yaw.\*
  - the need for corrections in pitch and bank.
1052. What does a reciprocating engine manifold pressure gauge indicate when the engine is not operating?
- Zero pressure.
  - The differential between the manifold pressure and the atmospheric pressure.
  - The existing atmospheric pressure.\*
1053. What is the operating principle of the sensing device used in an autopilot system?
- The reaction of the force 90° away from the applied force in the direction of gyro rotation.
  - The relative motion between a gyro and its supporting system.
  - The rate of change of motion between the gyro gimbal rings and the aircraft.\*
1054. The purpose of a localizer is to
- set the airplane on the proper approach angle to the runway.
  - indicate the distance the airplane is from the end of the runway.
  - align the airplane with the center of the runway.\*
1055. In an autopilot, which signal nullifies the input signal to the ailerons?
- Displacement signal.
  - Course signal.
  - Followup signal.\*
1056. VHF radio signals are commonly used in
- ATC communications.
  - VOR navigation.
  - both VOR navigation and ATC communications.\*
1057. On modern large aircraft, what electronic device typically monitors flight parameters and performs autopilot functions?
- Flight management computer.\*
  - Transponder.
  - Control/display unit.
1058. In the landing configuration GPWS typically monitors the radio (radar) altimeter; air data computer; instrument landing system, and
- aileron, rudder, and elevator positions.
  - landing gear and flap positions.\*
  - spoiler, slat, and stabilizer positions.

1059. In general, the purpose of an aircraft transponder is to
- continually transmit heading, speed, and rate of climb/decent etc. information to ATC.
  - monitor aircraft speed, heading, altitude, and attitude whenever the autopilot system is engaged.
  - receive an interrogation signal from a ground station and automatically send a reply back.\*
1060. When an antenna is installed, it should be fastened
- to the primary structure at the approximate intersection of the three aircraft axes.
  - with a reinforcing doubler on each side of the aircraft skin.\*
  - so that loads imposed are transmitted to the aircraft structure.
1061. After an automatic direction finding antenna has been installed, the
- antenna must be grounded.
  - loop must be calibrated.\*
  - transceiver must be compensated.
1062. Doublers are used when antennas are installed to
- eliminate antenna vibration.\*
  - prevent oil canning of the skin.
  - reinstate the structural strength of the aircraft skin.
1063. One antenna can be used for the radio range and standard broadcast bands in light aircraft because the
- two ranges are close together.
  - antenna is omnidirectional.\*
  - antenna length may be electronically adjusted.
1064. What characteristics of the installation of a rigid antenna on a vertical stabilizer should be evaluated?
- Polarization and impedance.
  - Impedance and interference.
  - Flutter and vibration.\*
1065. Long Range Navigation (LORAN) systems determine aircraft location by
- measuring the inertial forces acting on the aircraft.
  - means of pulsed signals transmitted from ground stations.\*
  - means of signals transmitted to and from navigation satellites.
1066. The preferred location of a VOR antenna on light aircraft is on
- the bottom of the fuselage and as far forward as possible.
  - top of the cabin with the apex of the V pointing forward.\*
  - top of the vertical stabilizer.
1067. Static dischargers help eliminate radio interference by dissipating static electricity into the atmosphere at
- low current levels.
  - high voltage level.\*
  - high current levels.
1068. A DME antenna should be located in a position on the aircraft that will
- not be blanked by the wing when the aircraft is banked.\*
  - permit interruptions in DME operation.
  - eliminate the possibility of the DME locking on a station.
1069. When bending coaxial cable, the bend radius should be at least
- 10 times the diameter of the cable.\*
  - 15 times the diameter of the cable.
  - 20 times the diameter of the cable.
1070. When installing a DME antenna, it should be aligned with the
- null position.
  - angle of incidence.\*
  - centerline on the airplane.
1071. The addition of avionics and associated antenna systems forward of the CG limit will affect
- empty weight and useful load.
  - CG limits and useful load.\*
  - useful load and maximum gross weight.
1072. How much clearance from the seat bottom is required when installing radio equipment under a seat?
- 3 inches with the seat unoccupied.\*
  - No set minimum as long as the equipment receives adequate cooling and damage protection.
  - 1 inch with the seat occupied and subjected to maximum downward seat spring deflection.
1073. The purpose of a glideslope system is to
- provide for automatic altitude reporting to air traffic control.
  - indicate the distance the airplane is from the end of the runway.
  - assist the pilot in making a correct angle of descent to the runway.\*
1074. A gasket or sealant is used between the antenna mast and fuselage skin
- to prevent the entry of moisture.
  - for aircraft pressurization only.
  - to prevent abrasion between the antenna mast and fuselage skin.\*
1075. Installed radio equipment is protected from damage due to jolts and vibration by
- shock mounts.\*
  - spring and/or viscous damper mounted racks.
  - rubber or foam cushioning material between circuit chassis and case.
1076. Which of the following provides manual maneuverability of the aircraft while the autopilot is engaged?
- Servo amplifier.
  - Directional gyro indicator.
  - Flight controller.\*



1077. In which control element of an autopilot system is an attitude indicator?  
 a. Command.\*                      b. Sensing.  
 c. Input.
1078. What will occur if an aircraft attitude is changed by its autopilot system in order to correct for an error and the involved control surfaces are returned to streamline by the time the aircraft has reached its correct position?  
 a. Overshoot and oscillation.  
 b. Undershoot and oscillation.  
 c. Normal operation.\*
1079. What component of an autopilot system applies torque to the control surfaces of an aircraft?  
 a. Servo.\*                              b. Controller.  
 c. Gyro.
1080. What is the main purpose of a servo in an autopilot system?  
 a. Correct for displacement of the aircraft about its axis.  
 b. Change mechanical energy to electrical energy.  
 c. Move the control surface as commanded.\*
1081. Which channel of an autopilot detects changes in pitch attitude of an aircraft?  
 a. Elevator.\*  
 b. Aileron.  
 c. Rudder.
1082. The elevator channel of an autopilot controls the aircraft about which axis of rotation?  
 a. Roll.  
 b. Longitudinal.  
 c. Lateral.\*
1083. What component is the sensing device in an electromechanical autopilot system?  
 a. Servo.  
 b. Gyro.\*  
 c. Controller.
1084. A fully integrated autopilot controls the aircraft around how many axes?  
 a. Two.                                      b. Three.\*  
 c. Four.
1085. An aircraft antenna installation must be grounded  
 a. to the airframe.\*  
 b. to the engine.  
 c. to the radio rack.
1086. When operationally checking an autopilot system on the ground, after the aircraft's main power has been switched on, the autopilot should be engaged  
 a. only after the gyros come up to speed and the amplifier warms up.\*  
 b. whenever the operator desires.  
 c. for only a few minutes at a time.
1087. What is the primary purpose of an autopilot?  
 a. To relieve the pilot of control of the aircraft during long periods of flight.\*  
 b. To fly a more precise course for the pilot.  
 c. To obtain the navigational aid necessary for extended overwater flights.
1088. (1) Use solder to attach bonding jumpers on radio equipment. (2) Radio equipment is bonded to the aircraft in order to provide a low impedance ground and to minimize radio interference from static electrical charges. Regarding the above statements,  
 a. only No. 1 is true.  
 b. both No. 1 and No. 2 are true.  
 c. only No. 2 is true.\*
1089. When must the radio station license be displayed in an aircraft equipped with a two-way radio?  
 a. When the aircraft is operated outside the U.S..  
 b. When the aircraft is returned to service.  
 c. When the aircraft is certified for IFR flight.\*
1090. When would a U.S. resident NOT be required to hold a Federal Communications Commission (FCC) Restricted Radio Telephone Operator Permit to operate two-way aircraft VHF radio equipment?  
 a. When flying to or communicating with destinations outside the United States.  
 b. When the radio equipment is operated in aircraft certified for VFR flight only.\*  
 c. When flying or communicating within the United States.
1091. Part of the ADF system used on aircraft includes  
 a. RMI indicator antenna.  
 b. marker beacon antenna.  
 c. sense and loop antennas.\*
1092. When installing coaxial cable, it should be secured firmly along its entire length  
 a. at 1-foot intervals.\*  
 b. wherever the cable sags.  
 c. at 2-foot intervals.
1093. When must the emergency locator transmitter (ELT) battery be replaced (other than reading the replacement date) ?  
 a. When the transmitter has been in use for more than one cumulative hour.\*  
 b. Must be replaced annually or if the five G switch has been activated.  
 c. When the transmitter has been tested more than ten times.
1094. An emergency locator transmitter (ELT) battery must be capable of furnishing power for signal transmission for at least  
 a. 36 hours.  
 b. 48 hours.\*  
 c. 72 hours.

1095. The preferred location of an ELT is
- where it is readily accessible to the pilot or a member of the flightcrew while the aircraft is in flight.
  - as far aft as possible.\*
  - as far aft as possible, but forward of the vertical fin.
1096. An emergency locator transmitter (ELT) is normally activated by an inertial switch or equivalent mechanism if subjected to a force of a prescribed intensity and duration. It must activate when the force is applied
- parallel to the longitudinal axis of the aircraft.
  - parallel to the vertical axis of the aircraft.
  - in any direction relative to the aircraft axes.\*
1097. How may the battery replacement date be verified for an emergency locator transmitter (ELT) ?
- By removing the batteries and testing them under a measured load to determine if 50 percent of the useful life remains.
  - By observing the battery replacement date marked on the outside of the transmitter.\*
  - By activating the transmitter and measuring the signal strength.
1098. How may the operation of an installed emergency locator transmitter (ELT) be verified during aircraft inspection?
- By moving the deactivating switch from the DISARM position to the ARM position, while monitoring the civil emergency frequency with a communications receiver at five minutes after the hour.
  - By activating the 5 g switch and turning the unit on at five minutes after the hour.
  - By tuning a communications receiver to the civil emergency frequency, and activating the ELT momentarily within five minutes after the hour.\*
1099. Dutch roll, a combination yawing and rolling oscillation that affects many sweptwing aircraft, is counteracted with
- a flight director system.
  - an aileron damper system.
  - a yaw damper system.\*
1100. What is used in many aircraft to prevent bubbles in the fuel after it leaves the tank when atmospheric pressure is lower than fuel vapor pressure?
- Air fuel separators.
  - Anti-foaming additives.
  - Boost pumps.\*
1101. A transmitter in a fuel pressure warning system serves what function?
- Transmits an electrical signal to fluid pressure.
  - Converts fluid pressure to an electrical signal.\*
  - Transmits fluid pressure directly to the indicator.
1102. When fuel quantity is measured in pounds instead of gallons, the measurement will be more accurate because fuel volume
- varies with temperature change.\*
  - increases when temperature decreases.
  - varies with changes in atmospheric pressure.
1103. Why are integral fuel tanks used in many large aircraft?
- To reduce fire hazards.
  - To facilitate servicing.
  - To reduce weight.\*
1104. The primary purpose of a fuel tank sump is to provide
- a positive system of maintaining the design minimum fuel supply for safe operation.
  - place where water and dirt accumulations in the tank can collect and be drained.\*
  - reserve supply of fuel to enable the aircraft to land safely in the event of fuel exhaustion.
1105. (1) A fuel pressure relief valve is required on an aircraft positive displacement fuel pump. (2) A fuel pressure relief valve is required on an aircraft centrifugal fuel boost pump. Regarding the above statements,
- only No. 1 is true.
  - only No. 2 is true.
  - both No. 1 and No. 2 are true.\*
1106. (1) A fuel pressure gauge is a differential pressure indicator. (2) A fuel pressure gauge indicates the pressure of the fuel entering the carburetor. Regarding the above statements,
- only No. 2 is true.
  - both No. 1 and No. 2 are true.\*
  - neither No. 1 nor No. 2 is true.
1107. (1) A fuel heater can use engine bleed air as a source of heat. (2) A fuel heater can use engine lubricating oil as a source of heat. Regarding the above statements,
- only No. 1 is true.
  - both No. 1 and No. 2 are true.\*
  - neither No. 1 nor No. 2 is true.
1108. (1) Gas turbine engine fuel systems are very susceptible to the formation of ice in the fuel filters. (2) A fuel heater operates as a heat exchanger to warm the fuel. Regarding the above statements,
- only No. 1 is true.
  - only No. 2 is true.
  - both No. 1 and No. 2 are true.\*
1109. (1) The function of a fuel heater is to protect the engine fuel system from ice formation (2) An aircraft fuel heater cannot be used to thaw ice in the fuel screen. Regarding the above statements,
- only No. 1 is true.\*
  - only No. 2 is true.
  - both No. 1 and No. 2 are true.

1110. In some aircraft with several fuel tanks, the possible danger of allowing the fuel supply in one tank to become exhausted before the selector valve is switched to another tank is prevented by the installation of
- a fuel pressure warning signal system.\*
  - a fuel pressure relief valve.
  - an engine fuel pump bypass valve.
1111. Which of the following would be most useful to locate and troubleshoot an internal fuel leak in an aircraft fuel system?
- Aircraft structure repair manual.
  - Illustrated parts manual.
  - A fuel system schematic.\*
1112. Aircraft defueling should be accomplished
- with the aircraft's communication equipment on and in contact with the tower in case of fire.
  - in a hangar where activities can be controlled.
  - in the open air for good ventilation.\*
1113. Where is fuel pressure taken for the pressure warning signal on most aircraft engines?
- Outlet side of the boost pump.
  - Fuel pressure line of the carburetor.
  - Between the fuel pump and the strainer.\*
1114. Integral fuel tanks are
- usually constructed of nonmetallic material.
  - readily removed from the aircraft.
  - formed by the aircraft structure.\*
1115. A fuel pressure warning switch contacts close and warning light is turned on when
- a measured quantity of fuel has passed through it.
  - the fuel flow stops.
  - the fuel pressure drops below specified limits.\*
1116. Which of the following would give the first positive indication that a change over from one fuel tank to another is needed?
- Fuel pressure warning.
  - Fuel pressure gauge.
  - Fuel quantity indicator.\*
1117. What method is used on turbine powered aircraft to determine when the condition of the fuel is approaching the danger of forming ice crystals?
- Fuel pressure warning.\*
  - Fuel pressure gauge.
  - Fuel temperature indicator.
1118. What unit is generally used to actuate the fuel pressure warning system?
- Fuel flowmeter.
  - Pressure sensitive mechanism.\*
  - Fuel pressure gauge.
1119. What is the purpose of flapper type check valves in integral fuel tanks?
- To allow defueling of the tanks by suction.
  - To prevent fuel from flowing away from the boost pumps.\*
  - To allow the engine driven pumps to draw fuel directly from the tank if the boost pump fails.
1120. Select one means of controlling the fuel temperature on turbine-powered aircraft.
- Engine bleed air to the fuel filter.
  - Engine bleed air to the fuel tank.
  - Engine bleed air to a heat exchanger.\*
1121. What unit would be adjusted to change the fuel pressure warning limits?
- Fuel flowmeter bypass valve.\*
  - Pressure sensitive mechanism.
  - Fuel pressure relief valve.
1122. What must each fuel quantity indicator be calibrated to read during level flight when the quantity of fuel remaining is equal to the unusable fuel supply?
- The total unusable fuel quantity.
  - Both the total unusable fuel quantity and the unusable fuel quantity in each tank.
  - Zero.\*
1123. In an electronic type fuel quantity indicating system, the tank sensing unit is a
- capacitor.\*
  - variable resistor.
  - variable inductor.
1124. What is the purpose of a float operated transmitter installed in a fuel tank?
- It sends an electric signal to the fuel quantity indicator.\*
  - It senses the total amount of fuel density.
  - It senses the dielectric qualities of fuel and air in the tank.
1125. A typical large transport aircraft fuel manifold system allows how many of the following?
- All tanks can be serviced through a single connection.
  - Any engine can be fed from any tank.
  - All engines can be fed from all tanks simultaneously.
  - A damaged tank can be isolated from the rest of the fuel system.
- Two.
  - Three.
  - Four.\*
1126. Which of the following is necessary to effectively troubleshoot a fuel pressure warning system?
- The manufacturer's maintenance manuals.\*
  - AC 43.13-1A, Acceptable Methods, Techniques, and Practices 3/4 Aircraft Inspection and Repair.
  - A set of Federal Aviation Regulations.

1127. To prevent vapor lock in fuel lines at high altitude, some aircraft are equipped with
- vapor separators.
  - direct injection type carburetors.
  - booster pumps.\*
1128. Which is a characteristic of petroleum base hydraulic fluid? How may the antiknock characteristics of a fuel be improved?
- By adding a knock inhibitor.\*
  - By adding a knock enhancer.
  - By adding a fungicide agent.
1129. If a bladder type fuel tank is to be left empty for an extended period of time, the inside of the tank should be coated with a film of
- engine oil.\*
  - linseed oil.
  - ethylene glycol.
1130. What is the maximum vapor pressure allowable for an aircraft fuel?
- 7 PSI.\*
  - 5 PSI.
  - 3 PSI.
1131. What can be done to eliminate or minimize the microbial growth problem in an aircraft jet fuel tank?
- Use anti icing and antibacterial additives.\*
  - Add CO<sub>2</sub> as a purgative.
  - Keep the fuel tank topped off.
1132. The vapor pressure of aviation gasoline is
- lower than the vapor pressure of automotive gasoline.
  - higher than the vapor pressure of automotive gasoline.\*
  - approximately 20 PSI at 100 °F
1133. Microbial growth is produced by various forms of micro organisms that live and multiply in the water interfaces of jet fuels. Which of the following could result if microbial growth exists in a jet fuel tank and is not corrected?
- Interference with fuel flow.
  - Interference with fuel quantity indicators.
  - Engine seizure.
  - Electrolytic corrosive action in a metal tank.
  - Lower grade rating of the fuel.
  - Electrolytic corrosive action in a rubber tank.
- 1, 2, 4.\*
  - 2, 3, 5.
  - 1, 5, 6.
1134. (1) If aviation gasoline vaporizes too readily, fuel lines may become filled with vapor and cause increased fuel flow. (2) A measure of a gasoline's tendency to vapor lock is obtained from the Reid vapor pressure test. Regarding the above statements,
- only No. 2 is true.\*
  - both No. 1 and No. 2 are true.
  - neither No. 1 nor No. 2 is true.
1135. When routing a fuel line between two rigidly mounted fittings the line should
- have at least one bend between such fittings.\*
  - be a straight length of tubing and clamped to the aircraft structure.
  - have a flexible line added between two metal lines to allow for ease of installation.
1136. (1) On a large aircraft pressure refueling system, a pressure refueling receptacle and control panel will permit one person to fuel or defuel any or all fuel tanks of an aircraft. (2) Because of the fuel tank area, there are more advantages to a pressure fueling system in light aircraft. Regarding the above statements,
- only No. 1 is true.\*
  - only No. 2 is true.
  - both No. 1 and No. 2 are true.
1137. The type of fuel boost pump that separates air and vapor from the fuel before it enters the line to the carburetor is the
- gear type pump.
  - centrifugal type pump.\*
  - sliding vane type pump.
1138. If an aircraft is fueled from a truck or storage tank which is known to be uncontaminated with dirt or water, periodic checks of the aircraft's fuel tank sumps and system strainers
- can be eliminated except for the strainer check before the first flight of the day and the fuel tank sump check during 100-hour or annual inspections.
  - are still necessary due to the possibility of contamination from other sources.\*
  - can be sharply reduced since contamination from other sources is relatively unlikely and of little consequence in modern aircraft fuel systems.
1139. A fuel temperature indicator is located in the fuel tanks on some turbine powered airplanes to tell when the fuel may be
- getting cold enough to form hard ice.
  - in danger of forming ice crystals.\*
  - about to form rime ice.
1140. One advantage of electrical and electronic fuel quantity indicating systems is that the indicator
- can be located any distance from the tank(s).\*
  - has no movable devices.
  - always measures volume instead of mass.
1141. What type of fuel booster pump requires a pressure relief valve?
- Concentric.
  - Sliding vane.
  - Centrifugal.\*

1142. The location of leaks and defects within the internal portions of the fuel system can usually be determined by
- visual inspection for evidence of wet spots and stains, and feeling for unusually warm components.
  - performing a fuel flow check.
  - observing the pressure gauge and operating the selector valves.\*
1143. According to Part 23, what minimum required markings must be placed at or near each appropriate fuel filler cover for reciprocating engine-powered airplanes?
- The word 'Avgas' and the minimum fuel grade.\*
  - The word 'Fuel' and usable fuel capacity.
  - The word 'Avgas' and the total fuel capacity.
1144. Why is it necessary to vent all aircraft fuel tanks?
- To ensure a positive head pressure for a submerged boost pump.
  - To exhaust fuel vapors.
  - To limit pressure differential between the tank and atmosphere.\*
1145. Why are centrifugal type boost pumps used in fuel systems of aircraft operating at high altitude?
- Because they are positive displacement pumps.\*
  - To supply fuel under pressure to engine driven pumps.
  - To permit cooling air to circulate around the motor.
1146. Flapper valves are used in fuel tanks to
- reduce pressure.
  - prevent a negative pressure.
  - act as check valves.\*
1147. Fuel boost pumps are operated
- to provide a positive flow of fuel to the engine.\*
  - primarily for fuel transfer.
  - automatically from fuel pressure.
1148. What is one disadvantage of using aromatic aviation fuels?
- A fuel intercooler is required.
  - Deteriorates rubber parts.\*
  - Results in low fuel volatility.
1149. What minimum required markings must be placed on or near each appropriate fuel filler cover on utility category aircraft?
- The word 'Avgas' and the minimum fuel grade, and the total fuel tank capacity.
  - The word 'Avgas' and the minimum fuel grade or designation for the engines, and the usable fuel tank capacity.
  - The word 'Avgas' and the minimum fuel grade.\*
1150. The purpose of the baffle plate in a fuel tank is to
- provide an expansion space for the fuel.
  - resist fuel surging within the fuel tank.\*
  - provide internal structural integrity.
1151. What precautions must be observed if a gravity feed fuel system is permitted to supply fuel to an engine from more than one tank at a time?
- The tank airspaces must be interconnected.\*
  - The fuel outlet ports of each tank must have the same cross sectional area.
  - Each tank must have a valve in its outlet that automatically shuts off the line when the tank is empty. r vapor pressure.
  - microbial contaminants.
1152. An electrical type fuel quantity indicating system consists of an indicator in the cockpit and a
- float operated transmitter installed in the tank.\*
  - float resting on the surface of the tank.
  - float operated receiver installed in the tank.
1153. What is the recommended practice for cleaning a fuel tank before welding?
- Purge the tank with air.
  - Flush the inside of the tank with clean water.
  - Steam clean the tank interior.\*
1154. If it is necessary to enter an aircraft's fuel tank, which procedure should be avoided?
- Continue purging the tank during the entire work period.
  - Station an assistant outside the fuel tank access to perform rescue operations if required.
  - Conduct the defueling and tank purging operation in an air conditioned building.\*
1155. When inspecting a removable rigid fuel tank for leaks, what procedure should be followed?
- pressurize the tank with air and brush with soapy water.\*
  - fill the tank with water and pressurize with air and brush with soapy water.
  - pressurize the tank with air and submerge in water to locate leaks.
1156. What is one purpose of a fuel tank vent?
- To maintain atmospheric pressure.\*
  - To decrease fuel vapor pressure.
  - To decrease tank internal air pressure.
1157. How is the outlet fuel pressure regulated on a submerged, single speed, centrifugal type fuel pump?
- By the engine driven pump's design and internal clearance.
  - By the first check valve downstream from the pump.
  - By the pump's design and internal clearances.\*
1158. Which of the following may be used for the repair of fuel leaks on most integral fuel tanks?
- Welding and resealing.\*
  - Brazing and resealing.
  - Riveting and resealing.

1159. Pressure fueling of aircraft is usually accomplished through
- pressure connections on individual fuel tanks.
  - at least one single point connection.\*
  - individual fuel tank overwing and/or fuselage access points.
1160. Aircraft pressure fueling systems instructional procedures are normally placarded on the
- fuel control panel access door.\*
  - lower wing surface adjacent to the access door.
  - aircraft ground connection point.
1161. What flight safety related advantage does a pressure fueling system provide?
- Keeps the aircraft within weight and balance limitations.
  - Reduces the chances for fuel contamination.\*
  - Reduces the time required for fueling.
1162. Which gas is used for purging an aircraft fuel tank?
- Helium or argon.
  - Carbon dioxide.
  - Carbon monoxide.\*
1163. Which of the following precautions is most important during refueling operations?
- All outside electrical sources must be disconnected from the aircraft.
  - Fuel to be used must be appropriately identified.
  - All electrical switches must be in OFF position.\*
1164. Why is the main fuel strainer located at the lowest point in the fuel system?
- It traps any small amount of water that may be present in the fuel system.\*
  - It provides a drain for residual fuel.
  - It filters and traps all micro organisms that may be present in the fuel system.
1165. Fuel system components must be bonded and grounded in order to
- drain off static charges.\*
  - prevent stray currents.
  - retard galvanic corrosion.
1166. What is the primary purpose of the crossfeed system?
- To allow the feeding of any engine from any tank\*.
  - To allow the feeding of fuel from one tank for defueling.
  - To provide automatic refueling of a tank to any desired level.
1167. Normal fuel crossfeed system operation in multiengine aircraft
- calls for jettisoning of fuel overboard to correct lateral instability.
  - reduces contamination and/or fire hazards during fueling or defueling operations.
  - provides a means to maintain a balanced fuel load condition.\*
1168. Which procedure must be followed when defueling aircraft with sweptback wings?
- Defuel all the tanks at one time.
  - Defuel the inboard wing tanks first.
  - Defuel the outboard wing tanks first.\*
1169. Fuel jettisoning past the limits prescribed by Federal Aviation Regulations is usually prevented by
- closely monitoring the fuel quantity and turning off the fuel dump switch(es).
  - dump limit valves or a low level circuit.\*
  - standpipes in the fuel tanks.
1170. Fuel is moved overboard in most fuel jettison systems by
- boost pumps.\*
  - gravity.
  - gravity and engine driven fuel pumps.
1171. A fuel jettison system is required under certain conditions if the maximum takeoff weight exceeds the maximum landing weight. What regulations cover the requirements of fuel jettisoning?
- Federal Aviation Regulation Part 43 and 91.\*
  - Federal Aviation Regulation Part 23, 25 and CAM 4b.
  - Federal Aviation Regulation Part 21, 43 and CAM 8.
1172. Which of the following is employed to maintain lateral stability when jettisoning fuel?
- Two separate independent systems.
  - Crossfeed system.\*
  - Two interconnected systems.
1173. (1) The fuel jettison valve must be designed to allow flight personnel to close the valve during any part of the jettisoning operation. (2) During the fuel jettisoning operation, the fuel must discharge clear of any part of the airplane. Regarding the above statements,
- both No. 1 and No. 2 are true.\*
  - only No. 2 is true.
  - neither No. 1 nor No. 2 is true.
1174. The primary purpose of an aircraft's fuel jettison system is to quickly achieve a
- lower landing weight.\*
  - balanced fuel load.
  - reduced fire hazard.
1175. Before fueling an aircraft by using the pressure fueling method, what important precaution should be observed?
- The truck pump pressure must be correct for that refueling system.\*
  - The truck pump pressure must be adjusted for minimum filter pressure.
  - The aircraft's electrical system must be on to indicate quantity gauge readings.

1176. The capacitance type (electronic) fuel quantity indicator
- has no moving parts in the tank.\*
  - has two tubes separated by a mica dielectric in the tank.
  - utilizes a float operated variable capacitor.
1177. How does temperature affect fuel weight?
- Cold fuel is heavier per gallon.\*
  - Warm fuel is heavier per gallon.
  - Temperature has no effect.
1178. What are the four general types of fuel quantity gauges?
- Sight glass.
  - Mechanical.
  - Electrical.
  - Electronic.
  - Bourdon tube.
  - Vane type transmitter.
  - Litmus indicator.
  - Direct reading static pressure type.
- 1, 2, 3, 4.\*
  - 1, 3, 6, 8.
  - 2, 3, 5, 7.
1179. A capacitance type fuel quantity indicating system measures fuel in
- pounds.\*
  - pounds per hour.
  - gallons.
1180. What is the dielectric (nonconducting material) in a capacitance type fuel quantity indicating system?
- Outer shell of the capacitor.
  - Fuel in the tank.
  - Fuel and air in the tank.\*
1181. A fuel totalizer is a component which indicates the
- total amount of fuel being consumed by all engines\*
  - amount of fuel in any given tank.
  - amount of fuel in all tanks.
1182. One advantage of electrical and electronic fuel quantity indicating systems is that
- the indicators are calibrated in gallons; therefore, no conversion is necessary.
  - only one transmitter and one indicator are needed regardless of the number of tanks.
  - several fuel tank levels can be read on one indicator.\*
1183. Why is the capacitance fluid quantity indicating system more accurate in measuring fuel level than a mechanical type?
- Only one probe and one indicator are necessary for multiple tank configurations.
  - It measures in gallons and converts to pounds.\*
  - It measures by weight instead of volume.
1184. A probe or a series of probes is used in what kind of fuel quantity indicating system?
- Selsyn.
  - Capacitor.\*
  - Synchro.
1185. The electronic type fuel quantity indicating system consists of a bridge circuit,
- an amplifier, an indicator, and a tank unit.\*
  - a tank, an amplifier, and an indicator.
  - a tank unit, a tank, and an amplifier.
1186. A drip gauge may be used to measure
- the amount of fuel in the tank.\*
  - system leakage with the system shut down.
  - fuel pump diaphragm leakage.
1187. An aircraft's integral fuel tank is
- usually located in the bottom of the fuselage.
  - a part of the aircraft structure.\*
  - a self sealing tank.
1188. What type of remote reading fuel quantity indicating system has several probes installed in each fuel tank?
- Electromechanical.
  - Electronic.\*
  - Direct reading.
1189. Fuel jettisoning is usually accomplished
- through a common manifold and outlet in each wing.\*
  - by gravity flow into the outboard wing tanks and overboard through a common outlet in each wing.
  - through individual outlets for each tank.
1190. The probe of a capacitance type fuel level gauge is essentially a
- float actuated variable capacitor.
  - capacitor with fuel and air acting as one plate.
  - capacitor with fuel and air acting as a dielectric.\*
1191. When installing a rigid fuel line, 1/2 inch in diameter, at what intervals should the line be supported?
- 24 inches.\*
  - 12 inches.
  - 16 inches.
1192. Why are jet fuels more susceptible to water contamination than aviation gasoline?
- Jet fuel has a higher viscosity than gasoline.\*
  - Jet fuel is lighter than gasoline; therefore, water is more easily suspended.
  - Condensation is greater because of the higher volatility of jet fuels.
1193. What method would be used to check for internal leakage of a fuel valve without removing the valve from the aircraft?
- Place the valve in the OFF position, drain the strainer bowl, and with boost pump on, watch to see if fuel flows to the strainer bowl.
  - Remove fuel cap(s), turn boost pump(s) on, and watch for bubbling in the tanks.
  - Apply regulated air pressure on the downstream side of the fuel pump and listen for air passing through the valve.\*

1194. What should be used to remove flux from an aluminum tank after welded repairs?
- Soft brush and warm water.
  - 5 percent solution of nitric or sulfuric acid.\*
  - Mild solution of soap and warm water.
1195. What should be used to inert an integral fuel tank before attempting repairs?
- CO<sub>2</sub>.\*
  - Water.
  - Steam.
1196. The presence of fuel stains around a fuel nozzle would indicate
- too much fuel pressure.
  - excessive airflow across the venturi.
  - clogged fuel nozzle.\*
1197. Fuel leaks are usually classified as a stain, a seep, a heavy seep, or a running leak. As a general rule,
- stains, seeps, and heavy seeps are not flight hazards.
  - all fuel leaks regardless of location or severity are considered a hazard to flight.
  - stains, seeps, and heavy seeps, (in addition to running leaks) are considered flight hazards when located in unvented areas of the aircraft.\*
1198. Entrained water in aviation turbine fuel is a hazard because of its susceptibility to freezing as it passes through the filters. What are common methods of preventing this hazard?
- Micromesh fuel strainers and fuel heater.
  - High-velocity fuel pumps and fuel heater.
  - Anti-icing fuel additives and fuel heater.\*
1199. When moving the mixture control on a normally operating engine into the idle cutoff position, engine RPM should
- slightly increase before the engine starts to die.\*
  - slightly decrease and then drop rapidly.
  - remain the same until the cutoff is effected, then drop rapidly.
1200. The purpose of a diaphragm in a vane type fuel pump is to
- equalize fuel pressure at all speeds.
  - vary fuel pressure according to throttle setting.
  - compensate fuel pressures to altitude changes.\*
1201. Which aircraft fuel quantity indicating system incorporates a signal amplifier?
- Electronic.\*
  - Sight glass.
  - Electrical.
1202. During inspection of the terminal strips of an aircraft electrical system, it should be determined that
- only locknuts have been used for terminal attachment to the studs.
  - the terminal studs are anchored against rotation.\*
  - only plain nuts and lockwashers have been used for terminal attachment to the studs.
1203. Why are the iron cores of most induction coils laminated?
- To reduce the core reluctance.
  - To increase the core permeability.
  - To reduce the effects of eddy currents.\*
1204. How does the routing of coaxial cables differ from the routing of electrical wiring?
- Coaxial cables are routed parallel with stringers or ribs.\*
  - Coaxial cables are routed at right angles to stringers or ribs.
  - Coaxial cables are routed as directly as possible.
1205. In aircraft electrical systems, automatic reset circuit breakers
- should not be used as circuit protective devices.\*
  - are useful where only temporary overloads are normally encountered.
  - must be used in all circuits essential to safe operation of the aircraft.
1206. A certain switch is described as a single pole, double throw switch (SPDT). The throw of a switch indicates the number of
- circuits each pole can complete through the switch.
  - terminals at which current can enter or leave the switch.
  - places at which the operating device (toggle, plunger, etc..) will come to rest and at the same time open or close a circuit.\*
1207. When considering an alteration, the criteria upon which the selection of electric cable size should be based are
- applied voltage and allowable voltage drop.
  - current carrying capacity and allowable voltage drop.\*
  - current carrying capacity and applied voltage.
1208. What is an important factor in selecting aircraft fuses?
- The current exceeds a predetermined value.
  - The voltage rating should be lower than the maximum circuit voltage.
  - Capacity matches the needs of the circuit.\*
1209. What is the advantage of a current limiter?
- It breaks circuit quickly.
  - It can be reset easily.
  - It will take overload for a short period.\*
1210. One advantage of using ac electrical power in aircraft is
- that ac electrical motors can be reversed while dc motors cannot.
  - greater ease in stepping the voltage up or down.\*
  - that the effective voltage is 1.41 times the maximum instantaneous voltage; therefore, less power input is required.



1211. What is the advantage of a circuit breaker when compared to a fuse?
- Never needs replacing.
  - Always eliminates the need of a switch.
  - Resettable and reusable.\*
1212. Certain transport aircraft use ac electrical power for all normal operation and battery furnished dc electrical power for standby emergency use. In aircraft of this type that operate no dc generators, the batteries are kept charged by
- inverters which use the aircraft's ac generators as a source of power.
  - alternators which use the aircraft's generators as a source of power.
  - rectifiers which use the aircraft's ac generators as a source of power.\*
1213. The voltage in an ac transformer secondary that contains twice as many loops as the primary will be
- greater and the amperage less than in the primary.\*
  - greater and the amperage greater than in the primary.
  - less and the amperage greater than in the primary.
1214. If the positive field lead between a generator and a generator control panel breaks and is shorted while the engine is running, a voltmeter connected to generator output would indicate
- zero voltage.
  - residual voltage.\*
  - normal voltage.
1215. What is a method used for restoring generator field residual magnetism?
- Flash the fields.\*
  - Reseat the brushes.
  - Energize the armature.
1216. The major advantages of alternating current (AC) over direct current (DC) is the fact that its current and voltage can easily be increased or decreased
- by means of an inverter.
  - by means of a rectifier.
  - by means of a transformer.\*
1217. Which of the following must be accomplished when installing an anticollision light?
- Install a switch independent of the position light switch.\*
  - Use shielded electrical cable to assure fail safe operation.
  - Connect the anticollision light to the aircraft position light switch.
1218. The circuit breaker in the instrument lighting system protects the
- lights from too much current.
  - wiring from too much current.\*
  - wiring from too much voltage.
1219. A circuit protection device called a current limiter is essentially a slow-blow fuse and is designed to be used in
- 400 cycle AC circuits.
  - heavy power circuits.\*
  - starter-generator circuits.
1220. Which of the following copper electrical cable sizes should be selected to replace a No. 6 aluminum electrical cable?
- No. 4.\*
  - No. 6.
  - No. 8.
1221. In installations where the ammeter is in the generator or alternator lead, and the regulator system does not limit the maximum current that the generator or alternator can deliver, the ammeter can be redlined at what percent of the generator or alternator rating?
- 50.
  - 75.\*
  - 100.
1222. Which statement relating to electric wiring is true?
- When attaching a terminal to the end of an electric cable, it should be determined that the strength of the cable to terminal joint is at least twice the tensile strength of the cable.
  - When attaching a terminal to the end of an electric cable, it should be determined that the strength of the cable to terminal joint is at least equal to the tensile strength of the cable itself.
  - All electric cable splices should be covered with soft insulating tubing (spaghetti) for mechanical protection against external abrasion.\*
1223. Bonding connections should be tested for
- resistance value.\*
  - amperage value.
  - reactance.
1224. What kind of switch should you install in a single wire circuit that required the switch to be manually held in the ON position?
- Single pole, single throw (SPST), two position normally open (NO).
  - Single pole, single throw (SPST), single-position.
  - Single pole, double throw (SPDT), single-position normally open (NO).\*
1225. Where electric cables must pass through holes in bulkheads, formers, ribs, firewalls, etc., the wires should be protected from chafing by
- wrapping with electrical tape.
  - using a suitable grommet.
  - wrapping with plastic.\*
1226. How should a voltmeter be connected?
- In series with the source.
  - In parallel with the load.\*
  - In series with the load.

1227. The strength of the core of an electromagnet depends upon the material from which it is constructed and which of the following?
- The number of turns of wire in the coil and the applied voltage.
  - The number of turns of wire in the coil and the amount of current (amperes) passing through the coil.\*
  - The size (cross section) and the number of turns of wire in the coil and the applied voltage.
1228. If it is necessary to use an electrical connector where it may be exposed to moisture, the mechanic should
- coat the connector with grease.
  - use a special moisture proof type.
  - spray the connector with varnish or zinc chromate\*.
1229. The three kinds of circuit-protection devices used most commonly in aircraft circuits are
- circuit breakers, resistors, and current limiters.\*
  - circuit breakers, fuses, and current limiters.
  - circuit breakers, capacitors, and current limiter plug-ins mechanical reset types.
1230. If a wire is installed so that it comes in contact with some moving parts, what protection should be given the wire?
- Wrap with soft wire solder into a shield.
  - Wrap with friction tape.
  - Pass through conduit.\*
1231. In the American Wire Gauge (AWG) system of numbers used to designate electrical wire sizes, the number assigned to a size is related to its
- combined resistance and current carrying capacity.
  - current carrying capacity.
  - cross sectional area.\*
1232. What is the voltage drop for a No. 18 copper wire 50 feet long to carry 12.5 amperes, continuous operation?  
Use the formula  $VD = RLA$   
VD = Voltage drop  
R = Resistance per ft = .00644  
L = Length of wire  
A = Amperes
- 1/2V.
  - 1V.
  - 4V.\*
1233. What is the purpose of the selection of derated switches for known continuous load current applications?
- To calculate the voltage drop across the circuit.
  - To prevent short circuits in the motor field windings.
  - To obtain reasonable switch efficiency and service life.\*
1234. A circuit breaker is installed in an aircraft electrical system primarily to protect the
- circuit and should be located as close to the source as possible.\*
  - circuit and should be located as close to the unit as possible.
  - electrical unit in the circuit and should be located as close to the source as possible.
1235. In troubleshooting an electrical circuit, if an ohmmeter is properly connected across a circuit component and some value of resistance is read,
- the component has continuity and is open.
  - either the component or the circuit is shorted.
  - the component has continuity and is not open.\*
1236. In an ac circuit with no phase lead or lag, which is true?
- Real power is zero.
  - Real power is greater than apparent power.
  - Real power equals apparent power.\*
1237. How are generators rated?
- Watts at rated voltage.
  - Amperes at rated voltage.\*
  - The impedance at rated voltage.
1238. How is a shunt wound dc generator connected?
- One field is shunted across the other.
  - Both fields are shunted across the armature.
  - The field and armature are shunted with a capacitor.\*
1239. The poles of a generator are laminated to
- reduce flux losses.
  - increase flux concentration.
  - reduce eddy current losses.\*
1240. What is the frequency of an alternator dependent upon?
- Voltage.
  - RPM.\*
  - Current.
1241. The inductor type inverter output voltage is controlled by the
- number of poles and the speed of the motor.
  - voltage regulator.\*
  - dc stator field current.
1242. Residual voltage is a result of magnetism in the field windings.
- field shoes.\*
  - armature.
1243. A relay is
- a magnetically operated switch.\*
  - a device which converts electrical energy to kinetic energy.
  - any conductor which receives electrical energy and passes it on with little or no resistance.

1244. CSD driven generators are usually cooled by
- oil spray.
  - an integral fan.
  - both ram air and an integral fan.\*
1245. A CSD unit drives a generator through the use of
- a synchronous electric motor.
  - an infinitely variable mechanical gearing system.\*
  - a variable hydraulic pump and hydraulic motor.
1246. Integrated drive generators (IDG) employ a type of high output ac generator that utilizes
- brushes and slip rings to carry generated dc exciter current to the rotating field.
  - battery current to excite the field.
  - a brushless system to produce current.\*
1247. If the IDG scavenge oil filter is contaminated with chunks or pieces of metal
- change the oil at 25 hour intervals.
  - remove and replace the IDG.\*
  - replace the oil and filter at 25 hour intervals.
1248. When necessary during operation, CSD disconnect is usually accomplished by
- a switch in the cockpit.\*
  - circuit breaker activation.
  - a shear section in the input shaft.
1249. A CSD unit that is disconnected in flight, due to a malfunction such as overtemperature, may be reconnected
- automatically if the temperature falls back into the normal operating range.
  - manually by the flightcrew.
  - only on the ground by maintenance personnel.\*
1250. The generator rating is usually found stamped on the
- firewall.
  - generator.\*
  - engine.
1251. If any one generator in a 24-volt dc system shows low voltage, the most likely cause is
- an out of adjustment voltage regulator.\*
  - shorted or grounded wiring.
  - a defective reverse current cutout relay.
1252. A battery generator system provides direct current. On installations requiring alternating current from the battery generator system, it is necessary to have
- a transformer.
  - an inverter.\*
  - a variable resistor between the battery and generator.
1253. A voltage regulator controls generator voltage by changing the
- resistance in the generator output circuit.
  - current in the generator output circuit.
  - resistance of the generator field circuit.\*
1254. The overvoltage control automatically protects the generator system when excessive voltage is present by
- opening the shunt field circuit.
  - opening and resetting the field control relay.\*
  - breaking a circuit to the trip coil of the field control relay.
1255. When dc generators are operated in parallel to supply power for a single load, their controls include an equalizer circuit to assure that all generators share the load equally. The equalizer circuit operates by
- increasing the output of the low generator to equal the output of the high generator.
  - decreasing the output of the high generator to equal the output of the low generator.
  - increasing the output of the low generator and decreasing the output of the high generator until they are equal.\*
1256. What is the maximum amount of time a circuit can be in operation and still be an intermittent duty circuit?
- One minute.
  - Two minutes.\*
  - Three minutes.
1257. The most common method of regulating the voltage output of a compound dc generator is to vary the
- current flowing through the shunt field coils.\*
  - total effective field strength by changing the reluctance of the magnetic circuit.
  - resistance of the series field circuit.
1258. What is the ratio of turns between the primary coil winding and the secondary coil winding of a transformer designed to triple its input voltage?
- Primary will have one third as many turns as its secondary.\*
  - Primary will have twice as many turns as its secondary.
  - Primary will have three times as many turns as its secondary.
1259. Oil canning of the sides of aluminum or steel electrical junction boxes is considered to be
- normal operation in vibration prone areas.
  - a shorting hazard.\*
  - acceptable operation.
1260. How can the direction of rotation of a dc electric motor be changed?
- Interchange the wires which connect the motor to the external power source.
  - Reverse the electrical connections to either the field or armature windings.\*
  - Rotate the positive brush one commutator segment.

1261. Aircraft which operate only ac generators (alternators) as a primary source of electrical power normally provide current suitable for battery charging through the use of
- a stepdown transformer and a rectifier.\*
  - an inverter and a voltage dropping resistor.
  - a dynamotor with a half wave dc output.
1262. During inspection of an anticollision light installation for condition and proper operation, it should be determined that
- electrical or mechanical interconnections are provided so that the anticollision light will operate at all times that the position light switch is in the ON position.\*
  - an appropriately rated fuse is in position at the light to protect the connecting wiring against electrical faults.
  - the anticollision light can be operated independently of the position lights.
1263. Major adjustments on equipment such as regulators, contactors, and inverters are best accomplished outside the airplane on test benches with necessary instruments and equipment. Adjustment procedure should be as outlined by
- the equipment manufacturer.
  - the FAA.
  - aircraft technical orders.\*
1264. Some electric motors have two sets of field windings wound in opposite directions so that the
- speed of the motor can be more closely controlled.
  - power output of the motor can be more closely controlled.
  - motor can be operated in either direction.\*
1265. When using an ohmmeter to check the continuity of a generator field coil, the coil should
- be removed from the generator housing.
  - show high resistance when the meter prods are connected to the terminals of the coil.
  - show very low resistance if it is a series field coil.\*
1266. What is the color and orientation of the position lights for navigation on civil airplanes?
- Left side - green, right side - red, rear aft - white.
  - Left side - red, right side - green, rear aft - white.\*
  - Left side - white, right side - green, rear aft - red.
1267. When a diode is checked for an open circuit or a short circuit, it should be
- in the circuit.
  - checked with a milliamp ammeter.
  - disconnected from the circuit.\*
1268. The type of electric wire terminals used for most aircraft applications, in addition to providing good current carrying capabilities, are designed primarily
- to prevent circuit failure due to terminal disconnection.
  - for uncomplicated and rapid circuit connection and disconnection.
  - for permanent connection to the circuit.\*
1269. Aluminum wire must be stripped very carefully because
- high resistance will develop in stripping nicks.
  - stripping nicks can cause short circuits.
  - individual strands will break easily after being nicked.\*
1270. The commutator of a generator
- changes direct current produced in the armature into alternating current as it is taken from the armature.
  - changes alternating current produced in the armature into direct current as it is taken from the armature.\*
  - reverses the current in the field coils at the proper time in order to produce direct current.
1271. An ammeter in a battery charging system is for the purpose of indicating the
- amperage available for use.
  - total amperes being used in the airplane.
  - rate of current used to charge the battery.\*
1272. In a generator, what eliminates any possible sparking to the brush guides caused by the movement of the brushes within the holder?
- The brush pigtail.
  - Brush spring tension.\*
  - Undercutting the mica on the commutator.
1273. The purpose of a rectifier in an electrical system is to change
- the frequency of alternating current.
  - direct current to alternating current.
  - alternating current to direct current.\*
1274. How does the magnetic brake used to stop rotation of an electric motor armature operate?
- Centrifugal force releases a rotating brake cog from a stationary notch when the armature reaches a certain speed and magnetic force re engages the cog when the electrical power is turned off.\*
  - A friction brake is applied by a magnet and released by a spring.
  - A friction brake is applied by a spring and released by a magnet.
1275. A voltage regulator controls generator output by
- introducing a resistance in generator-to-battery lead in the event of overload.
  - shorting out field coil in the event of overload.
  - varying current flow to generator field coil.\*
1276. Which type of dc generator is not used as an airplane generator?
- Externally grounded.
  - Series wound.\*
  - Compound wound.
1277. What is the most accurate type of frequency measuring instrument?
- Integrated circuit chip having a clock circuit.\*
  - Electrodynamometers using electromagnetic fields.
  - Electromagnets using one permanent magnet.

1278. During ground operation, aircraft generator cooling is usually accomplished by
- auxiliary air cooled through an air/fuel heat exchanger.\*
  - an integral fan.
  - an external motor-driven fan.
1279. What does a rectifier do?
- Changes direct current into alternating current.
  - Changes alternating current into direct current.\*
  - Reduces voltage.
1280. What type of instrument is used for measuring very high values of resistance?
- Megohmmeter.\*
  - Shunt type ohmmeter.
  - Multimeter.
1281. Which of the following is not one of the purposes of interpoles in a generator?
- Reduce field strength.\*
  - Overcome armature reaction.
  - Reduce arcing at the brushes.
1282. The starting current of a series wound dc motor, in passing through both the field and armature windings, produces a
- low starting torque.
  - speed slightly higher when unloaded.
  - high starting torque.\*
1283. Electric circuits are protected from overheating by means of
- thermocouples.\*
  - shunts.
  - fuses.
1284. One purpose of a growler test is to determine the presence of
- an out of round commutator.
  - a broken field lead.
  - a shorted armature.\*
1285. Electric wire terminals for most aircraft applications must be what type?
- Slotted.
  - Hook.
  - Ring.\*
1286. What is the principal advantage of the series wound dc motor?
- High starting torque.
  - Suitable for constant speed use.\*
  - Low starting torque.
1287. If a generator is equipped with a vibrator type voltage regulator, the actual time the voltage regulator points remain open
- depends on the load carried by the generator.
  - is controlled by the reverse current cutout relay point clearance.
  - is increased when the external load is greater than the generator output.\*
1288. A series wound dc electric motor will normally require
- more current at high RPM than at low RPM.
  - approximately the same current throughout its operating range of speed.
  - more current at low RPM than at high RPM.\*
1289. When ac generators are operated in parallel, the
- amperes and frequency must both be equal.
  - frequency and voltage must both be equal.\*
  - amperes and voltage must both be equal.
1290. To what depth is the mica insulation between the commutator bars of a dc generator undercut?
- One half the width of the mica.
  - Equal to twice the width of the mica.
  - Equal to the width of the mica.\*
1291. Which motor would be most likely to have an armature brake?
- Starter motor.
  - Landing light retraction motor.\*
  - Inverter drive motor.
1292. The method most often used in overcoming the effect of armature reaction is through the use of
- interpoles.\*
  - shaded poles.
  - drum wound armatures in combination with a negatively connected series field.
1293. The only practical method of maintaining a constant voltage output from an aircraft generator under varying conditions of speed and load is to vary the
- strength of the magnetic field.\*
  - number of conductors in the armature.
  - speed at which the armature rotates.
1294. The pole pieces or shoes used in a dc generator are a part of the
- armature assembly.
  - field assembly.\*
  - brush assembly.
1295. How many cycles of ac voltage are produced in a six pole alternator of the revolving field type for each revolution of the rotor?
- Four.
  - Three.\*
  - Six.
1296. If the reverse current cutout relay contact points fail to open after the generator output has dropped below battery potential, current will flow through the generator armature
- in the normal direction and through the shunt field opposite the normal direction.
  - and the shunt field opposite the normal direction.
  - opposite the normal direction and through the shunt field in the normal direction.\*

1297. What is a cause of generator brush arcing?
- Seating brushes with No. 000 sandpaper.
  - Carbon dust particles.
  - Low spring tension.\*
1298. To test generator or motor armature windings for opens,
- place armature in a growler and connect a 110V test light on adjacent segments; light should light\*
  - check adjacent segments on commutator with an ohmmeter on the high resistance scale.
  - use a 12/24V test light between the armature core segments and the shaft.
1299. What is normally used to bond noncontinuous stainless steel aircraft components?
- Stainless steel jumpers.
  - Copper jumpers.\*
  - Aluminum jumpers.
1300. Aircraft fuse capacity is rated in
- volts.
  - ohms.
  - amperes.\*
1301. When adding a rheostat to a light circuit to control the light intensity, it should be connected in
- parallel with the light.
  - series with the light.\*
  - series parallel with the light switch.
1302. Circuits that must be operated only in an emergency or whose inadvertent activation could endanger a system frequently employ
- guarded switches.\*
  - push-pull-type circuit breakers only (no switches)
  - spring-loaded to off toggle or rocker switches.
1303. If one switch is used to control all navigation lights, the lights are most likely connected
- in series with each other and parallel to the switch.
  - in series with each other and in series with the switch.
  - parallel to each other and in series with the switch\*
1304. Electric wiring installed in aircraft without special enclosing means(open wiring) offers the advantages of ease of installation, simple maintenance, and reduced weight. When bundling open wiring, the bundles should
- be limited as to the number of cables to minimize damage from a single electrical fault.
  - include at least one shielded cable to provide good bonding of the bundle to the airframe.
  - be limited to a minimum bend radius of five times the bundle diameter to avoid excessive stresses on the cable insulation.\*
1305. Grounding is electrically connecting a conductive object to the primary structure. One purpose of grounding is to
- prevent current return paths.
  - allow static charge accumulation.
  - prevent development of radio frequency potentials\*
1306. Which of the following should be accomplished in the installation of aircraft wiring?
- Support the bundle to structure and/ or solid fluid lines to prevent chafing damage.\*
  - Provide adequate slack in the wire bundle to compensate for large changes in temperature.
  - Locate the bundle above flammable fluid lines and securely clamp to structure.
1307. What protection to wires and cables does conduit provide when used in aircraft installations?
- Electromagnetic.
  - Mechanical.\*
  - Structural.
1308. When using the voltage drop method of checking circuit resistance, the
- input voltage must be maintained at a constant value.\*
  - output voltage must be maintained at a constant value.
  - input voltage must be varied.
1309. The nominal rating of electrical switches refers to continuous
- current rating with the contacts open.
  - voltage rating with the contacts closed.
  - current rating with the contacts closed.\*
1310. Aircraft electrical junction boxes located in a fire zone are usually constructed of
- asbestos.
  - cadmium plated steel.
  - stainless steel.\*
1311. To help minimize radio interference a capacitor will largely eliminate and provide a steady direct current if the capacitor is connected to the generator in
- parallel.\*
  - series.
  - series/ parallel.
1312. The primary considerations when selecting electric cable size are
- current carrying capacity and allowable voltage drop.\*
  - the voltage and amperage of the load it must carry.
  - the system voltage and cable length.
1313. The navigation lights of some aircraft consist of a single circuit controlled by a single switch which has an ON position and an OFF position, with no additional positions possible. This switch is referred to as a
- double pole, single throw (DPST), two position switch.
  - single pole, double throw (SPDT), two position switch.\*
  - single pole, single throw (SPST), two position switch.

1314. When handling a high voltage capacitor in an electrical circuit, be sure it
- has a full charge before removing it from the circuit.
  - has at least a residual charge before removing it from the circuit.
  - is fully discharged before removing it from the circuit.\*
1315. For general electrical use in aircraft, the acceptable method of attaching terminal to a wire is by
- crimping.
  - soldering.
  - crimping and soldering.\*
1316. If the (+) terminal of a voltmeter is connected to the (-) terminal of the source voltage and the (-) terminal of the meter is connected to the (+) terminal of the source voltage, the voltmeter will read
- correctly.
  - low voltage.
  - backwards.\*
1317. Which of the following is most likely to cause thermal runaway in a nickel-cadmium battery?
- A high internal resistance condition.
  - Excessive current draw from the battery.
  - Constant current charging of the battery to more than 100 percent of its capacity.\*
1318. If several long lengths of electrical cable are to be installed in rigid conduit, the possibility of damage to the cable as it is pulled through the conduit will be reduced by
- dusting the cable with powdered graphite.
  - dusting the cable with powdered soapstone.\*
  - applying a light coat of dielectric grease.
1319. How can it be determined if a transformer winding has some of its turns shorted together?
- Measure the input voltage with an ohmmeter.
  - The output voltage will be high.
  - The transformer will get hot in normal operation.\*
1320. (1) There are three basic types of dc motors; series, shunt, and compound. (2) In the series motor, the field windings, consisting of relatively few turns of heavy wire, are connected in series with the armature winding. Regarding the above statements,
- only No. 1 is true.
  - only No. 2 is true.
  - both No. 1 and No. 2 are true.\*
1321. Which of the following factors must be taken into consideration when determining the wire size to use for an aircraft installation?
- Mechanical strength.
  - Allowable power loss.
  - Ease of installation.
  - Resistance of current return path through the aircraft structure.
  - Permissible voltage drop.
  - Current carrying capability of the conductor.
  - Type of load (continuous or intermittent)
- 2, 5, 6, 7.
  - 1, 2, 4, 5.\*
  - 2, 4, 6, 7.
1322. When selecting hardware for attaching bonding connections to an aircraft structure, which of the following should be considered?
- Mechanical strength.
  - Allowable power loss.
  - Ease of installation.
  - Permissible voltage drop.
  - Amount of current to be carried.
  - Type of load (continuous or intermittent).
- 1, 3, 5.\*
  - 4, 5, 6.
  - 1, 2, 3.
1323. The most common method of attaching a pin or socket to an individual wire in an MS electrical connector is by
- crimping.\*
  - soldering.
  - crimping and soldering.
1324. Which of the following are the major parts of a dc motor?
- Armature assembly.
  - Field assembly.
  - Brush assembly.
  - Commutator.
  - Pole piece.
  - Rheostat.
  - End frame.
- 1, 2, 3, 7.
  - 2, 3, 4, 5.\*
  - 3, 5, 6, 7.
1325. The pin section of an AN/MS connector is normally installed on
- the power supply side of a circuit.\*
  - the ground side of a circuit.
  - either side of a circuit (makes no difference).
1326. AN/MS electrical connectors are specifically designed to meet
- Technical Standard Order (TSO) specifications.
  - military specifications.
  - International Civil Aviation Organization (ICAO) standards.\*
1327. When approved, splices may be used to repair manufactured harnesses or installed wiring. The maximum number of splices permitted between any two connectors is
- one.\*
  - two.
  - three.
1328. What is the minimum bend radius for an electrical wire bundle?
- Ten times the outside diameter of the bundle.\*
  - Five times the outside diameter of the bundle.
  - Fifteen times the outside diameter of the bundle.

1329. How should the splices be arranged if several are to be located in an electrical wire bundle?
- Staggered along the length of the bundle.\*
  - Grouped together to facilitate inspection.
  - Enclosed in a conduit.
1330. The voltage output of an alternator may be regulated by controlling the
- speed of the alternator.
  - voltage output of the dc exciter.\*
  - resistance in the rotor windings.
1331. Landing gear warning systems usually provide which of the following indications?
- Red light for unsafe gear, no light for gear down, green light for gear up.
  - Green light for gear up and down, red light for unsafe gear.
  - Red light for unsafe gear, green light for gear down, no light for gear up.\*
1332. (1) A dc selsyn system is a widely used electrical method of indicating a remote mechanical movement or position (2) A synchro type indicating system is an electrical system used for transmitting information from one point to another. Regarding the above statements,
- only No. 1 is true.\*
  - only No. 2 is true.
  - both No. 1 and No. 2 are true.
1333. Which of the following conditions is most likely to cause the landing gear warning signal to sound?
- Landing gear locked down and throttle advanced.
  - Landing gear locked down and throttle retarded.
  - Landing gear not locked down and throttle retarded.\*
1334. Where is the landing gear safety switch usually located?
- On the main gear shock strut.\*
  - On the landing gear drag brace.
  - On the pilot's control pedestal.
1335. What safety device is actuated by the compression and extension of a landing gear strut?
- Uplock switch.
  - Downlock switch.\*
  - Ground safety switch.
1336. Which repair would require a landing gear retraction test?
- Landing gear safety switch.
  - Red warning light bulb.
  - Gear downlock microswitch.\*
1337. In most modern hydraulically actuated landing gear systems, the order of gear and fairing door operation is controlled by
- sequence valves.\*
  - shuttle valves.
  - microswitches.
1338. What landing gear warning device(s) is/are incorporated on retractable landing gear aircraft?
- A visual indicator showing gear position.
  - A light which comes on when the gear is fully down and locked.
  - A horn or other aural device and a red warning light.\*
1339. When a landing gear safety switch on a main gear strut closes at liftoff, which system is deactivated?
- Landing gear position system.\*
  - Antiskid system.
  - Aural warning system.
1340. The rotor in an autosyn remote indicating system uses
- an electromagnet.\*
  - a permanent magnet.
  - neither an electromagnet nor a permanent magnet.
1341. The basic difference between an autosyn and a magnesyn indicating system is the
- rotor.\*
  - transmitter.
  - receiver.
1342. The rotor in a magnesyn remote indicating system uses
- a permanent magnet.\*
  - an electromagnet.
  - an electromagnet and a permanent magnet.
1343. Which of the following are some uses for a dc selsyn system?
- Indicates position of retractable landing gear.
  - Indicates the angle of incidence of an aircraft.
  - Indicates the altitude of an aircraft.
  - Indicates cowl flaps or oil cooler door position.
  - Indicates fuel quantity.
  - Indicates the rate of climb of an aircraft.
  - Indicates position of wing flaps.
- 1, 4, 5, 7.\*
  - 2, 3, 4, 5.
  - 2, 3, 5, 6.
1344. The pneumatic (reed) type stall warning system installed in some light aircraft is activated by
- static air pressure.
  - positive air pressure.
  - negative air pressure.\*
1345. Microswitches are used primarily as limit switches to
- limit generator output.
  - control electrical units automatically.\*
  - prevent overcharging of a battery.
1346. An antiskid system is
- a hydraulic system.
  - an electrohydraulic system.\*
  - an electrical system.



1347. In a brake antiskid system, when an approaching skid is sensed, an electrical signal is sent to the skid control valve which
- acts as a bypass for the deboosters cylinders.
  - relieves the hydraulic pressure on the brake.\*
  - equalizes the hydraulic pressure in adjacent brakes.
1348. Antiskid braking systems are generally armed by
- a centrifugal switch.\*
  - a switch in the cockpit.
  - the rotation of the wheels above a certain speed.
1349. A typical takeoff warning indication system, in addition to throttle setting, monitors the position of which of the following?
- Ailerons, elevators, speed brake, and steerable fuselage landing gear.
  - Elevators, speed brake, flaps, and stabilizer trim.\*
  - Aerodynamically actuated slats, elevators, flaps, and speed brake.
1350. The primary purpose of a takeoff warning system is to alert the crew that a monitored flight control is not properly set prior to takeoff. The system is activated by
- an 80 knot airspeed sensor.
  - an ignition system switch not set for takeoff.
  - a thrust lever.\*
1351. (1) An airspeed indicator measures the differential between pitot and static air pressures surrounding the aircraft at any moment of flight. (2) An airspeed indicator measures the differential between pitot and cabin air pressures at any moment of flight. Regarding the above statements,
- both No. 1 and No. 2 are true.
  - only No. 2 is true.
  - only No. 1 is true.\*
1352. The angle of attack detector operates from differential pressure when the airstream
- is parallel to the longitudinal axis of the aircraft.
  - is not parallel to the true angle of attack of the aircraft.\*
  - is parallel to the angle of attack of the aircraft.
1353. When an airplane's primary flight control surfaces are set for a particular phase of flight, such as landing or takeoff, the corresponding control-surface indicating system will show
- flap/slat position.
  - speed break position.
  - trim position \*
1354. In an antiskid system, wheel skid is detected by
- an electrical sensor.\*
  - a discriminator.
  - a sudden rise in brake pressure.
1355. Which of the following functions does a skid control system perform?
- Normal skid control.
  - Normal braking.
  - Fail safe protection.
  - Locked wheel skid control.
  - Touchdown protection.
  - Takeoff protection.
- 1, 2, 3, 4.
  - 1, 3, 4, 5.\*
  - 1, 2, 5, 6.
1356. In the air with the antiskid armed, current cannot flow to the antiskid control box because
- landing gear squat switch is open.\*
  - landing gear down and lock switch is open.
  - landing gear antiskid valves are open.
1357. At what point in the landing operation does normal skid control perform its function?
- When wheel rotation deceleration indicates an impending skid.\*
  - When wheel rotation indicates hydroplaning condition.
  - Anytime the wheel is rotating.
1358. (1) An antiskid system is designed to apply enough force to operate just below the skid point. (2) A warning lamp lights in the cockpit when the antiskid system is turned off or if there is a system failure. Regarding the above statements,
- only No. 1 is true.\*
  - only No. 2 is true.
  - both No. 1 and No. 2 are true.
1359. (1) When an airplane is slowed below approximately 20 MPH, the antiskid system automatically deactivates to give the pilot full control of the brakes for maneuvering and parking. (2) An antiskid system consists basically of three components; wheel speed sensors, control box, and control valves. Regarding the above statements,
- only No. 1 is true.
  - only No. 2 is true.
  - both No. 1 and No. 2 are true.\*
1360. The purpose of antiskid generators is to
- monitor hydraulic pressure applied to brakes.\*
  - indicate when a tire skid occurs.
  - measure wheel rotational speed and any speed changes.
1361. Stall warning systems are generally designed to begin warning the pilot when a stall
- is imminent.\*
  - is starting to occur.
  - first affects the outboard portions of the wings.

1362. Arcing in an electrically heated windshield panel usually indicates a breakdown in the
- temperature sensing elements.
  - autotransformers.
  - conductive coating.\*
1363. Which of the following connects vacuum to the deicer boots when the systems is not in operation, to hold the boots tightly against the leading edges in flight?
- Vacuum relief valve.
  - Ejector.
  - Distributor valve.\*
1364. How do deicer boots help remove ice accumulations?
- By preventing the formation of ice.
  - By breaking up ice formations.\*
  - By allowing only a thin layer of ice to build up.
1365. Why are the tubes in deicer boots alternately inflated?
- Alternate inflation of deicer boot tubes keeps disturbance of the airflow to a minimum.\*
  - Alternate inflation of deicer boot tubes does not disturb airflow.
  - Alternate inflation of deicer boot tubes relieves the load on the air pump.
1366. Carburetor icing may be eliminated by which of the following methods?
- Alcohol spray and heated induction air.\*
  - Ethylene glycol spray and heated induction air.
  - Electrically heating air intake, ethylene glycol spray, or alcohol spray.
1367. Why should a chemical rain repellent not be used on a dry windshield?
- It will etch the glass.
  - It will restrict visibility.\*
  - It will cause glass crazing.
1368. What mixture may be used as a deicing fluid to remove frost from an aircraft surface?
- Ethylene glycol and isopropyl alcohol.\*
  - Methyl ethyl ketone and ethylene glycol.
  - Naphtha and isopropyl alcohol.
1369. What icing condition may occur when there is no visible moisture present?
- Injector ice.                      b. Inlet ice.
  - Carburetor ice.\*
1370. What should be used to melt the ice in a turbine engine if the compressor is immobile because of ice?
- Deicing fluid.                      b. Anti icing fluid.
  - Hot air.\*
1371. What is used as a temperature sensing element in an electrically heated windshield?
- Thermocouple.
  - Thermistor.\*
  - Thermometer.
1372. What maintains normal windshield temperature control in an electrically heated windshield system?
- Thermal overheat switches.
  - Thermistors.\*
  - Electronic amplifiers.
1373. What is the principle of a windshield pneumatic rain removal system?
- An air blast spreads a liquid rain repellent evenly over the windshield that prevents raindrops from clinging to the glass surface.
  - An air blast forms a barrier that prevents raindrops from striking the windshield surface.\*
  - A pneumatic rain removal system is simply a mechanical windshield wiper system that is powered by pneumatic system pressure.
1374. What are three methods of anti icing aircraft windshields?
- Blanket type heating system.
  - An electric heating element in the windshield.
  - Heated air circulating system.
  - Hot water system.
  - Windshield wipers and anti icing fluid.
  - Ribbon type heating system.
- 2, 3, 5.\*                              b. 1, 2, 6.
  - 2, 3, 4.
1375. What controls the inflation sequence in a pneumatic deicer boot system?
- Shuttle valve.
  - Vacuum pump.
  - Distributor valve.\*
1376. Which of the following is the best means to use when removing wet snow from an aircraft?
- A brush or a squeegee.\*
  - Hot air.
  - Warm water.
1377. When installing pneumatic surface-bonded type deicer boots,
- remove all paint from the area to be covered by the deicer boot.\*
  - apply a solution of glycerin and water between the rubber and the wing skin.
  - apply a silastic compound between the boot and the wing skin.
1378. Two possible sources of heat for the operation of a wing thermal anti-icing system are
- first stage of the aircycle turbine, turbo compressor .
  - compressor bleed air, aircraft electrical system.
  - combustion heater, exhaust gases.\*
1379. What is one check for proper operation of a pitot/static tube heater after replacement?
- Ammeter reading.\*
  - Voltmeter reading.
  - Continuity check of system.

1380. What is the source of pressure for inflating deicer boots on reciprocating engine aircraft?
- Vane type pump.\*
  - Gear type pump.
  - Piston type pump.
1381. Which of the following regulates the vacuum of the air pump to hold the deicing boots deflated when the pneumatic deicing system is off?
- Distributor valve.
  - Pressure regulator.
  - Suction relief valve.\*
1382. What may be used to clean deicer boots?
- Unleaded gasoline or Jet A fuel.
  - Naphtha.
  - Soap and water.\*
1383. Some aircraft are protected against airframe icing by heating the leading edges of the airfoils and intake ducts. When is this type of anti ice system usually operated during flight?
- Continuously while the aircraft is in flight.
  - In symmetric cycles during icing conditions to remove ice as it accumulates.
  - Whenever icing conditions are first encountered or expected to occur.\*
1384. Which of the following indications occur during a normal operational check of a pneumatic deicer system?
- Relatively steady readings on the pressure gauge and fluctuating readings on the vacuum gauge.
  - Fluctuating readings on the pressure gauge and relatively steady readings on the vacuum gauge.\*
  - Pressure and vacuum gauges will fluctuate as the deicer boots inflate and deflate.
1385. What method is usually employed to control the temperature of an anti icing system using surface combustion heaters?
- Thermo cycling switches.\*
  - Thermostats in the cockpit.
  - Heater fuel shutoff valves.
1386. What is the purpose of the distributor valve in a deicing system utilizing deicer boots?
- To equalize the air pressure to the left and right wings.
  - To sequence the deicer boots inflations symmetrically.\*
  - To distribute anti-icing fluid to the deicer boots.
1387. What is the purpose of the oil separator in the pneumatic deicing system?
- To protect the deicer boots from oil deterioration.\*
  - To remove oil from air exhausted from the deicer boots.
  - To prevent an accumulation of oil in the vacuum system.
1388. Where are the heat sensors located on most aircraft with electrically heated windshields?
- Imbedded in the glass.\*
  - Attached to the glass.
  - Around the glass.
1389. Which of the following are found in a laminated integral electrically heated windshield system?
- Autotransformer.
  - Heat control relay.
  - Heat control toggle switch.
  - 24V dc power supply.
  - Indicating light.
- 1, 2, 4, 5.
  - 2, 3, 4, 5.
  - 1, 2, 3, 5.\*
1390. A squib, as used in a fire protection system, is a
- temperature sensing device.
  - device for causing the fire extinguishing agent to be released.\*
  - probe used for installing frangible disks in extinguisher bottles.
1391. When used in fire detection systems having a single indicator light, thermal switches are wired in
- parallel with each other and in series with the light.\*
  - series with each other and the light.
  - series with each other and parallel with the light.
1392. Built-in aircraft fire-extinguishing systems are ordinarily charged with
- carbon dioxide and nitrogen.
  - halogenated hydrocarbons and nitrogen \*
  - sodium bicarbonate and nitrogen.
1393. In reference to aircraft fire extinguishing systems,
- during removal or installation, the terminals of discharge cartridges should be grounded or shorted.
  - before connecting cartridge terminals to the electrical system, the system should be checked with a voltmeter to see that no voltage exists at the terminal connections. Regarding the above statements,
- only No. 2 is true.\*
  - both No. 1 and No. 2 are true.
  - neither No. 1 nor No. 2 is true.
1394. What method is used to detect the thermal discharge of a built in fire extinguisher system?
- A discoloring of the yellow plastic disk in the thermal discharge line.
  - A rupture of the red plastic disk in the thermal discharge line.\*
  - The thermal plug missing from the side of the bottle.
1395. The thermal switches of a bimetallic thermal switch type fire detection system are heat sensitive units that complete circuits at a certain temperature. They are connected in
- parallel with each other, and in parallel with the indicator lights.
  - parallel with each other, but in series with the indicator lights.\*
  - series with each other, but in parallel with the indicator lights.

1396. On a periodic check of fire extinguisher containers, the pressure was not between minimum and maximum limits. What procedure should be followed?
- Release pressure if above limits.
  - Replace the extinguisher container.\*
  - Increase pressure if below limits.
1397. In some fire extinguishing systems, evidence that the system has been intentionally discharged is indicated by the absence of a
- red disk on the side of the fuselage.
  - green disk on the side of the fuselage.
  - yellow disk on the side of the fuselage.\*
1398. If a fire extinguisher cartridge is removed from a discharge valve for any reason, it
- must be pressure checked.
  - is recommended that the cartridge be used only on the original discharge valve assembly.\*
  - cannot be used again.
1399. Which of the following are fire precautions which must be observed when working on an oxygen system?
- Display 'No Smoking' placards.
  - Provide adequate fire fighting equipment.
  - Keep all tools and oxygen servicing equipment free from oil or grease.
  - Avoid checking aircraft radio or electrical systems.
- 1, 3, and 4.
  - 1, 2, and 4.
  - 1, 2, 3, and 4.\*
1400. The thermocouple fire warning system is activated by a
- certain temperature.
  - core resistance drop.
  - rate of temperature rise.\*
1401. Maintenance of fire detection systems includes the
- repair of damaged sensing elements.
  - removal of excessive loop or element material.
  - replacement of damaged sensing elements.\*
1402. A carbon dioxide (CO<sub>2</sub>) hand held fire extinguisher may be used on an electrical fire if the
- horn is nonmetallic.
  - handle is insulated.
  - horn is nonmagnetic.\*
1403. Which fire extinguishing agent is considered to be the least toxic?
- Carbon dioxide.
  - Bromotrifluoromethane (Halon 1301).
  - Bromochloromethane (Halon 1011).\*
1404. Which fire detection system measures temperature rise compared to a reference temperature?
- Fenwal continuous loop.
  - Lindberg continuous element.
  - Thermocouple.\*
1405. In what area of an aircraft would you find a carbon monoxide detector?
- Surface combustion heater compartment.
  - Cockpit and/or cabin.\*
  - Engine and/or nacelle.
1406. What occurs when a visual smoke detector is activated?
- A warning bell within the indicator alarms automatically.
  - A lamp within the indicator illuminates automatically.\*
  - The test lamp illuminates and an alarm is provided automatically.
1407. The types of fire extinguishing agents for aircraft interior fires are
- water, carbon dioxide, dry chemical, and halogenated hydrocarbons.\*
  - water, dry chemical, methyl bromide, and chlorobromomethane.
  - water, carbon tetrachloride, carbon dioxide, and dry chemical.
1408. When air samples contain carbon monoxide, portable carbon monoxide detectors containing yellow silica gel will turn which color?
- Blue.
  - Green.\*
  - Red.
1409. Smoke detection instruments are classified by their method of
- construction.
  - maintenance.
  - detection.\*
1410. Smoke in the cargo and/or baggage compartment of an aircraft is commonly detected by which instrument?
- Chemical reactor.
  - Photoelectric cell.\*
  - Sniffer.
1411. A contaminated carbon monoxide portable test unit would be returned to service by
- heating the indicating element to 300 °F to reactivate the chemical.
  - installing a new indicating element.\*
  - evacuating the indicating element with CO<sub>2</sub>.
1412. A thermocouple in a fire detection system causes the warning system to operate because
- it generates a small current when heated.\*
  - heat decreases its electrical resistance.
  - it expands when heated and forms a ground for the warning system.
1413. The proper fire extinguishing agent to use on an aircraft brake fire is
- water.
  - carbon dioxide.
  - dry powder chemical.\*

1414. Light refraction smoke detectors
- measure a reduction in the amount of visible or infrared light in the surrounding area.
  - sense light reflected from smoke particles passing through a chamber.\*
  - use radiation induced ionization to detect the presence of smoke.
1415. Why does the Fenwal fire detection system use spot detectors wired parallel between two separate circuits?
- A control unit is used to isolate the bad system in case of malfunction.
  - This installation is equal to two systems: a main system and a reserve system.
  - A short may exist in either circuit without causing a false fire warning.\*
1416. A fire extinguisher container can be checked to determine its charge by
- attaching a remote pressure gauge.
  - weighing the container and its contents.\*
  - a hydrostatic test.
1417. What is the color code for fire extinguisher lines?
- Brown.\*
  - Yellow.
  - Red and green.
1418. The most common cause of false fire warnings in continuous loop fire detection systems is
- proper routing or clamping of loops.
  - moisture.
  - dents, kinks, or crushed sensor sections.\*
1419. Smoke detectors which use a measurement of light transmissibility in the air are called
- electromechanical devices.
  - photoelectrical devices.\*
  - visual devices.
1420. The working voltage of a capacitor to which a.c. of pulsating d.c. is applied should be
- the same as or greater than the applied voltage
  - at least 50 percent greater than the applied voltage\*
  - 1.41 times the applied voltage
  - 0.707 times applied voltage.
1421. A circuit contains 10 ohms of resistance, 20 ohms of inductive reactance, and 30 ohms of capacitive reactance. The circuit is
- inductive \*
  - in resonance
  - resistive
  - capacitive.
1422. The opposition offered by a coil to the flow of alternating current is known as
- conductivity
  - impedance
  - reluctance
  - inductive reactance.\*
1423. An increase in the inductive reactance of a circuit will be due to increase in
- inductance and frequency \*
  - capacitance and voltage
  - Resistance and voltage
  - Resistance and capacitive reactance.
1424. The resistive force in a d.c. electrical circuit is measured in ohms and referred to as
- resistance \*
  - capacitance
  - reactance
  - inductance.
1425. When the capacitive reactance in an a.c. electrical circuit is equal to the inductive reactance, the circuit is
- in correct voltage phase angle
  - in correct current phase angle
  - out of phase
  - resonant.\*
1426. In an alternating current circuit, the effective voltage
- is equal to the maximum instantaneous voltage
  - is greater than the maximum instantaneous voltage
  - may be greater than or less than the maximum instantaneous voltage
  - is less than the maximum instantaneous voltage.\*
1427. The amount of electricity a capacitor can store is directly proportional to
- the distance between the plates and inversely proportional to the plate area.
  - the plate area and is not affected by the distance between the plates
  - the plate area and inversely proportional to the distance between the plates.\*
  - the distance between the plates and is not affected by the plate area.
1428. A transformer with a step-up ratio of 5 to 1 has a primary voltage of 24 V and a secondary amperage of 0.20 A. The primary amperage will be
- 1 A \*
  - 4.8 A
  - 0.40 A
  - cannot be determined from the information given.
1429. The phase relationship between the current and voltage in an inductive circuit is
- The current lags the voltage by  $0^\circ$
  - The current lags the voltage by  $90^\circ$  \*
  - The current leads the voltage by  $90^\circ$
  - The current leads the voltage by  $0^\circ$ .
1430. Current flow is measured in
- amperes \*
  - volts
  - watts.
  - electron flow.
1431. Unless otherwise specified, any values given for current or voltage in an alternating current circuit are assumed to be
- average values
  - instantaneous values
  - effective values \*
  - maximum values.

1432. The devices which will require the most electrical power during operation? (Note: 1 hp. = 746 W)
- A 12 V motor requiring 8 A
  - Four 30-W lamps in a 12 V parallel circuit
  - Two lights requiring 3 A each in a 24 - V Parallel system.\*
  - A 1/10 - horsepower, 24 V motor which is 75 percent efficient.
1433. The number of amperes that will be required by a 24 -V, 1/3 - horsepower electric motor, when operating at its rated load is (Note: hp. = 746 W)
- 10.4 \*
  - 13.8
  - 7.9
  - 25.6.
1434. A unit in a 28 V aircraft electrical system has a resistance of 10 ohms. The power it will use is
- 280 W
  - 7.84 W
  - 78.4 W \*
  - 28 W.
1435. A 12 V electric motor has 1,000 W input and 1 hp. output. Maintaining the same efficiency, the input power that will a 24 V, 1-hp. electric motor require is (Note: 1 hp. = 746 W)
- 1,000 W \*
  - 2,000 W
  - 500 W
  - Cannot be determined from the information given.
1436. A 28 V generator required to supply to a circuit containing five lamps in parallel, three of which have a resistance of 6 ohms each and two of which have a resistance of 5 ohms. The number of amperes required is :
- 1.11 A
  - 1 A
  - 0.9 A
  - 25.23 A. \*
1437. The rate of work done which equal to 1 hp is
- 33,000 ft. ib. per minute \*
  - 746 ft. ib. per second
  - 3,300 ft. ib. per minute
  - 55 ft. ib. per second.
1438. The wattage rating of a carbon resistor is determined by
- a gold band
  - a silver band
  - the size of the resistor.\*
  - a red band.
1439. The potential difference between two conductors which are insulated form each other is measured in
- ohms
  - volts \*
  - amperes.
  - coulombs.
1440. The ratio of the true power to the apparent power in an a.c. electrical circuit is called the power factor. If the true power and the power factor of a circuit are known, the apparent power can be determined by
- multiplying the true power times 100 times the power factor
  - multiplying the power factor times 100 times the power
  - dividing the true power times 100 by the power factor \*
  - dividing the power factor times 100 by the true power.
1441. A 24-V source is required to furnish 48 W to a parallel circuit consisting of four resistors of equal value. The voltage drop across each resistor is
- 12 V
  - 6V
  - 3V
  - 24V.\*
1442. When calculating power in a reactive or inductive a.c. circuit in the true power is
- more than the apparent power.
  - more than the apparent power in a reactive circuit and less than the apparent power in an inductive circuit
  - less than the apparent power in a reactive circuit and more than the apparent power an inductive circuit.
  - less than the apparent power.\*
1443. The power furnished in watts by the generator of the circuit in figure will be
- 288 W
  - 24 W
  - 48 W \*
  - 12 W.
1444. In figure 10.1, if resistor  $R_3$  is disconnected at the junction of  $R_3$  as shown. The ohm meter reading will be
- 9 ohms
  - 2.76 ohms
  - 3 ohms \*
  - 12 ohms.

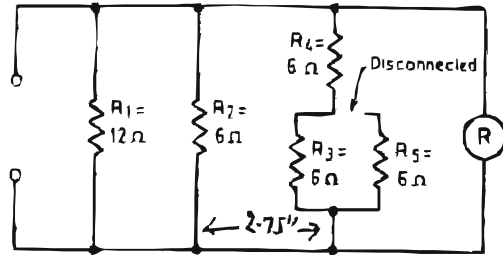


Figure 10.1

1445. Which of the following electrical measuring instruments is most likely to obtain its own source of electrical power?
- Wattmeter
  - Ammeter
  - Voltmeter
  - Ohmmeter.\*
1446. The D' Arsonval-type meter movement used in an ammeter, voltmeter, or ohmmeter measures
- current flow through the movement \*
  - potential difference across the movement
  - amount of resistance in series with the movement.
  - electrical power consumed by the movement.
1447. In figure 10.2, resistor  $R_3$  is disconnected at terminal D, the ohmmeter reading will be
- infinite resistance \*
  - 0 ohm
  - 10 ohms
  - 20 ohms.

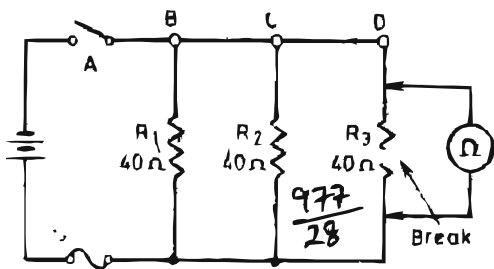


Figure 10.2

1448. In figure 10.3, with an ohmmeter connected into the circuit as shown, the ohmmeter reading will be
- a. 20 ohms \*
  - b. 6.66
  - c. 0 ohm
  - d. 10 ohms.

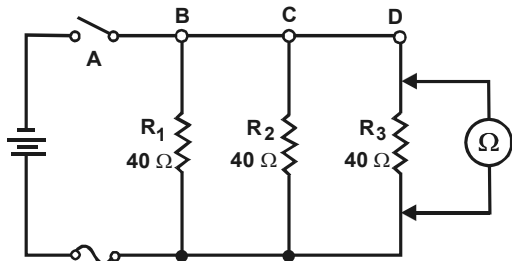


Figure 10.3

1449. In figure 10.4, the number of instruments (voltmeters and ammeters) which are installed correctly is

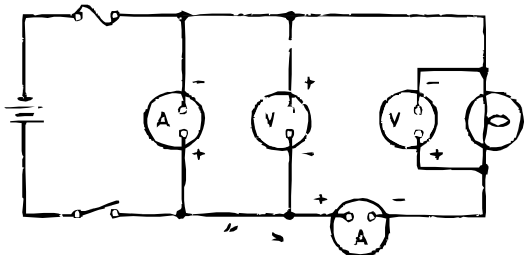


Figure 10.4

- a. Three \*
- b. One
- c. Two
- d. Four.

1450. The secondary voltage of a transformer depends upon the efficiency of the transformer and the ratio of the number of turns in the primary winding to the
- a. number of turns in the secondary winding \*
  - b. amount of current flowing in the primary winding
  - c. material from which the core is constructed.
  - d. distance separating the windings.

1451. The correct way to connect a test voltmeter in a circuit is
- a. in series with a unit
  - b. between source voltage and the load
  - c. in parallel with a unit \*
  - d. to place one lead on either side of the fuse.

1452. A cabin-entry light of 10 W and a dome light of 20 W are connected in parallel to a 30 V source. If the voltage across the 10 - W light is measured, it will be
- a. one-third of the input voltage.
  - b. twice the voltage across the 20-W light
  - c. equal to the voltage across the 20-W light \*
  - d. half the voltage across the 20-Watt light.

1453. The device used to measure the very high insulation resistance of electric cables is
- a. High-resistance voltmeter
  - b. Moving iron-vane meter
  - c. Megger \*
  - d. Multimeter.

1454. Before trouble-shooting, an electrical circuit with a continuity light, must be
- a. connected to the aircraft battery
  - b. connected to the aircraft generator
  - c. isolated \*
  - d. connected to an external source of power.

1455. In figure 10.5, a 14-ohm resistor is to be installed in a circuit carrying 0.05 A. The power to be dissipated by the resistor will be
- a. at least 0.70 milliwatt.
  - b. at least 35 milliwatts \*
  - c. less than 0.035 watt
  - d. less than 0.70 milliwatt.

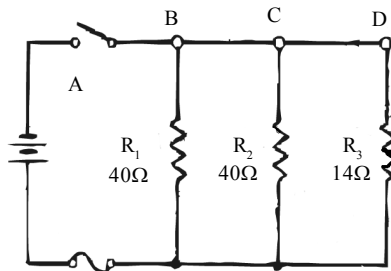


Figure 10.5

1456. The maximum number of electrical wire terminals that can be installed on one stud is
- a. Four terminals per stud \*
  - b. Three terminals per stud
  - c. Two terminals per stud
  - d. As many terminals as you can stack on and still have the required number of threads showing through the nut.

1457. In figure 10.6, the measured voltage of the series circuit between terminals A and B will be
- a. 1.5V
  - b. 3.0V \*
  - c. 4.5V
  - d. 6.0V.

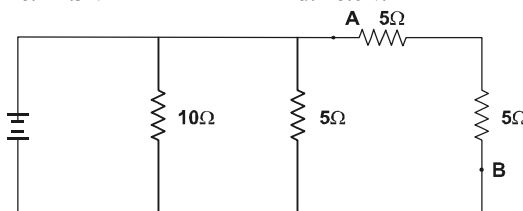


Figure 10.6

1458. The efficiency of power in an a.c. circuit is expressed by
- volt-amperes
  - true power
  - power factor \*
  - apparent power.

1459. The current in a 60 - W, 120 V electric light bulb is
- 0.5 A\*
  - 2 A
  - 1/3 A
  - 1/4 A.

1460. The device/system which will require the most electrical power is
- Four 30-W lamps arranged in 12 - V parallel circuit
  - A 12-V landing gear retraction motor which requires 8 A when operating the landing gear
  - A 1/10 -horsepower, 24-V motor which is 75 percent efficient.
  - 24-V anticollision light circuit consisting of two light assemblies which require 3A each during operation.\*

1461. The unit used to express electrical power is
- Colomb
  - Volt
  - Watt \*
  - Ampere.

1462. What is the operating resistance of a 30-W light bulb designed for a 28 -V system ?
- 30 ohms
  - 1.07 ohms
  - 26 ohms.\*
  - 0.93 ohm.

1463. Which of the following statements is correct when made in reference to a parallel circuit ?
- The current is equal in all portions of the circuit.
  - The current in amperes in the product of the EMF in volts times the total resistance of the circuit in ohms.
  - The total current is equal to the sum of the currents through the individual branches of the circuit.\*
  - The current in amperes can be found by dividing the EMF in volts by the sum of the resistors in ohms.

1464. Diodes are used in electrical power circuits primarily as
- current eliminators
  - circuit cutout switches
  - rectifiers \*
  - power transducer relays.

1465. Three resistors of 3 ohms, 5 ohms, and 22 ohms are connected in series in a 28-V circuit. The current will flow through the 3-ohm resistor is
- 9.3 A
  - 1.05 A
  - 1.03 A
  - 0.93 A.\*

1466. A good conductor of electricity is a material
- through or along which electrons move freely \*
  - whose protons are all on the outside
  - that contains few electrons
  - through or along which protons move freely.

1467. In figure 10.7, a circuit has an applied voltage of 30 V and load consisting of a 10-ohm resistor in series with a 20-ohm resistor. The voltage drop across the 10-ohm resistor will be

- 15 V
- 10 V \*
- 20 V
- 30 V.

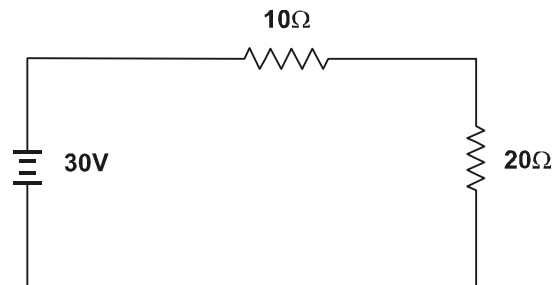


Figure 10.7

1468. In figure 10.8, the total current flowing in the wire between points C and D in will be

- 6.0 A
- 2.4 A
- 3.0 A
- 0.6 A.\*

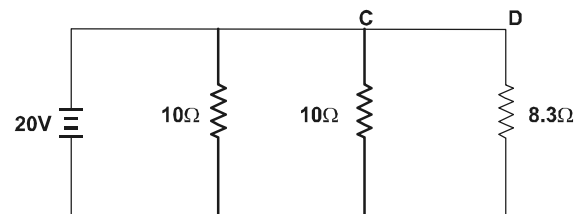


Figure 10.8

1469. In above figure10.8, the voltage across the 8.3 ohm resistor will be

- 2.4 V
- 12 V
- 20.4 V \*
- 25 V.

1470. In above figure10.8, the total resistance of the circuit across battery will be

- 16 ohms
- 10.4 ohms.
- 3.12 ohms
- 21.1 ohms.\*

1471. Which of the following is correct in reference to electrical resistance ?

- Two electrical devices will have the same combined resistance if they are connected in series as they will have if connected in parallel.
- If one of three bulbs in a parallel lighting circuit is removed, the total resistance of the circuit will become greater.
- An electrical device that has a high resistance will use more power than one with a low resistance with the same applied voltage.
- A 5-ohm resistor in a 12-volt circuit will use less current than a 10-ohm resistor in a 24-volt circuit.\*

1472. An electric cabin heater draws 25 A at 110 V. The current will that flow if the voltage is reduced to 85 will be

- 19.3 A
- 44.0 A \*
- 4.4 A
- 1.93 A.



1473. In figure 10.9, the total current  $I_T$  flow in the circuit is  
 a. 0.2 A \*                      b. 1.4 A  
 c. 0.4 A                         d. 0.8 A.
1474. In figure 10.9, the total resistance of the circuit is  
 a. 25 ohms.                      b. 35 ohms  
 c. 37 ohms                        d. 17 ohms.\*

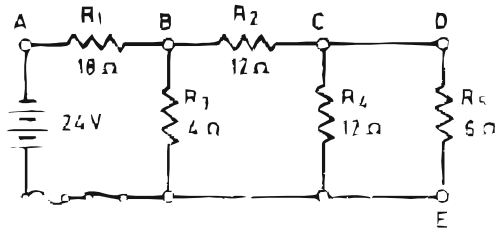


Figure 10.9

1475. Through which of the following will magnetic lines of force pass the most readily ?  
 a. Copper                        b. Iron \*  
 c. Aluminium                    d. Titanium.
1476. A 48 V source is required to furnish 192 W to a parallel circuit consisting of three resistors of equal value. The value of each resistor will be  
 a. 36 ohms \*  
 b. 4 ohms  
 c. 8 ohms  
 d. 12 ohms.
1477. Which is correct statement concerning a parallel circuit?  
 a. Total resistance will be smaller than the smallest resistor \*  
 b. Total resistance will decrease when one of the resistances is removed  
 c. Total voltage drop is the same as the total resistance  
 d. Total amperage remains the same, regardless of the resistance.
1478. The voltage drop in a conductor of known resistance is dependent on  
 a. the voltage of the circuit.  
 b. the amount and thickness of wire insulation  
 c. only the resistance of the conductor and does not change with a change in either voltage or amperage  
 d. the amperage of the circuit.\*
1479. An electric motor malfunctions causing it to over heat, which will cause an incorporated thermal switch to  
 a. prevent an open circuit  
 b. break the circuit \*  
 c. close the circuit  
 d. break the circuit when cooled.

## INSTRUMENTS

1480. An airspeed indicator will often have several required flight limitations indicated by colored arcs or radial lines. A white arc on the instrument face is used to indicate the  
 a. flap operating range \*  
 b. normal operating range  
 c. caution range  
 d. permissible aerobatics range.
1481. How would an airspeed indicator be marked to show the best rate-of-climb speed (one engine inoperative)?  
 a. A white arc                      b. A red radial line  
 c. A blue radial line \*            d. A green arc.
1482. The green arc on an aircraft temperature gauge indicates  
 a. the instrument is not calibrated  
 b. the desirable temperature range \*  
 c. a low, unsafe temperature range  
 d. a high, unsafe temperature range.
1483. What marking on an instrument is used to indicate whether the glass has slipped ?  
 a. Yellow arc                      b. White index mark \*  
 c. Green radial line                d. Red radial line.
1484. What color paint is used to indicate if the cover glass has slipped ?  
 a. Red                                      b. White \*  
 c. Yellow                                    d. Green.
1485. How is a flangeless instrument case mounted in an instrument panel ?  
 a. By four machine screws which extend through the instrument panel  
 b. By an expanding-type clamp secured to the back of the panel and tightened by a screw from the front of the instrument panel \*  
 c. By a metal shelt separate from and located behind the instrument panel  
 d. By press fit into the instrument panel and held in place by friction.
1486. Why are most electrical instruments mounted in iron or steel cases ?  
 a. To avoid damage to the instrument during maintenance  
 b. To facilitate removal or installation  
 c. To prevent interference from outside magnetic fields \*  
 d. To reduce heat build up in the instrument.
1487. When installing an instrument in an aircraft, who is responsible for making sure it is properly marked ?  
 a. An authorized inspector  
 b. The aircraft owner  
 c. The instrument installer \*  
 d. The instrument manufacturer.

1488. A red radial line on the face of an engine instrument indicates
- normal operating range
  - caution range
  - operation is permitted under certain conditions
  - maximum or minimum safe operating limits.\*
1489. An aircraft instrument panel is electrically bonded to the aircraft structure to
- allow static electricity buildup
  - act as a restraint strap
  - provide current return paths.\*
  - aid in the panel installation.
1490. An aircraft magnetic compass is swung at specified operating intervals in order to determine the
- accuracy of the lubber line
  - compass procession
  - compass variation
  - compass deviation.\*
1491. The operating mechanism of most hydraulic pressure gauges is
- a Bourdon tube \*
  - an airtight bellows
  - an airtight diaphragm
  - an evacuated bellow filled with an inert gas to which suitable arms, levers, and gears are attached.
1492. What is the fixed reference marker attached to the compass bowl of a magnetic compass called ?
- Reeder line
  - Lubber line \*
  - Card line
  - Pole line.
1493. Magnetic compass bowls are filled with a liquid to
- retard precession of the float
  - reduce deviation errors
  - counteract temperature and attitude changes
  - dampen the oscillation of the float.\*
1494. Instrument static system leakage can be detected by observing the rate of change in indication of the
- airspeed indicator after suction has been applied to the static system to cause a prescribed equivalent airspeed to be indicated
  - altimeter after pressure has been applied to the static system to cause a prescribed equivalent altitude to be indicated
  - airspeed indicator after pressure has been applied to the static system to cause a prescribed equivalent air-speed to be indicated
  - altimeter after suction has been applied to the static system to cause a prescribed equivalent altitude to be indicated.\*
1495. A turn-and-bank instrument indicates
- the longitudinal attitude of the aircraft during climb
  - trim and serves as an emergency source of bank information in case the attitude gyro fails.\*
  - the longitudinal attitude of the aircraft during descent
  - the need for corrections in pitch and bank anytime the aircraft deviates from preselected attitude.
1496. Thermocouple leads
- are designed for a specific installation and may not be altered \*
  - may be adjusted in length to fit any installation
  - may be installed with either lead to either post of the indicator
  - may be repaired using solderless connectors.
1497. Turbine engine exhaust gas temperatures are measured by
- using iron/constantan thermocouples
  - using electrical resistance thermometers
  - using chromel/alumel thermocouples \*
  - using ratiometer electrical resistance thermometers.
1498. Fuel flow transmitters are designed to transmit data
- mechanically
  - electrically \*
  - visually
  - utilizing fluid power.
1499. Who is authorized to repair an aircraft instrument ?
- A certificated mechanic with airframe and powerplant ratings
  - A certificated repair station approved for that class instrument \*
  - An appropriately rated airframe repair station
  - A certificated mechanic holding an inspection authorization.
1500. What is true primary purpose of an autopilot ?
- To relieve the pilot of control of the aircraft during long periods of flight \*
  - To provide a secondary system of aircraft during long periods of flight
  - To fly a more precise course for the pilot
  - To obtain the navigational aid necessary for extended overwater flights.
1501. Which of the following provides manual maneuverability of the aircraft while the autopilot is engaged ?
- Servo-amplifier
  - Attitude indicator
  - Directional gyro indicator
  - Flight controller.\*
1502. In autopilot, which signal nullifies the input signal to the ailerons ?
- Displacement signal
  - Course signal
  - Rated signal
  - Follow-up signal.\*

1503. In which control element of an autopilot system is an attitude indicator ?  
 a. Command                      b. Sensing \*  
 c. Computer                      d. Input.
1504. What is the operating principle of the sensing device used in an autopilot system ?  
 a. The reaction of the force  $90^\circ$  away from the applied force in the direction of gyro rotation  
 b. The relative motion between a gyro and its supporting system \*  
 c. The rate of change of motion between the gyro gimbal rings and the aircraft  
 d. the interaction of the applied force and the rigidity of the gyro.
1505. What is the purpose of the position transmitter in an autopilot system ?  
 a. To transmit a rate-change signal proportional to the rate of recovery  
 b. To develop and transmit a negative feed back signal.\*  
 c. To develop a signal proportional to the amount of flight deviation.  
 d. To transmit a signal to the controller when the aircraft on course.
1506. What component of an autopilot system applies torque to the control surfaces of an aircraft ?  
 a. Servo \*                      b. Controller  
 c. Gyro                      d. Computer.
1507. What is the main purpose of a servomotor in an autopilot system ?  
 a. Correct for displacement of the aircraft about its axis  
 b. Change mechanical energy to electrical energy  
 c. Move the control surface as commanded \*  
 d. Drive the control surface back to the streamlined position.
1508. What component is the sensing device in an electromechanical autopilot system ?  
 a. Servo                      b. Turn and bank  
 c. Gyro \*                      d. Controller.
1509. A fully integrated autopilot controls the aircraft around how many axes ?  
 a. one                      b. Two  
 c. Three \*                      d. Four.
1511. What is the most common power source for an ELT (emergency locator transmitter) ?  
 a. A self-contained battery \*  
 b. A direct unfused connection to the aircraft electrical power system  
 c. A special interconnection to the aircraft battery which allows current to flow in only one direction  
 d. An isolating transformer connected to the normal aircraft electrical power system.
1512. When an antenna is installed, it should be fastened  
 a. to the primary structure at the aircraft's directional pivotal point  
 b. to the primary structure at the approximate intersection of the three aircraft axes  
 c. with a reinforcing doubler on each side of the aircraft skin  
 d. so that loads imposed are transmitted to the aircraft structure.\*
1513. After an automatic direction finding antenna has been installed  
 a. the antenna must be grounded  
 b. the loop must be calibrated \*  
 c. the extra length of wire between the loop and receiver must be removed  
 d. the transceiver must be compensated.
1514. Doublers are used when antennas are installed  
 a. to eliminate antenna vibration  
 b. to reduce aircraft flutter  
 c. to prevent oil canning of the skin  
 d. to reinstate the structural strength of the aircraft skin.\*
1515. One antenna can be used for the radio range and standard broadcast bands in light aircraft because the  
 a. two ranges are close together \*  
 b. antenna is omnidirectional  
 c. antenna length may be electronically adjusted.  
 d. quadrantal error is minimised.
1516. A gasket or sealant is used between the antenna mast and fuselage skin  
 a. to prevent the entry of moisture \*  
 b. so the attachment studs may be drawn tighter  
 c. for aircraft pressurisation only  
 d. to prevent abrasion between the antenna mast and fuselage skin.
1517. The preferred location of a VOR antenna on light aircraft is  
 a. on the bottom of the fuselage and as far forward as possible  
 b. any convenient location on the top of the fuselage  
 c. on top of the cabin with the apex on the V pointing forward \*  
 d. on top of the vertical stabilizer.

## RADIO & NAVIGATION

1510. The ELT (emergency locator transmitter) battery  
 a. replacement date must be marked on the outside of the transmitter \*  
 b. must be a dry-cell type  
 c. must be replaced annually  
 d. replacement date must be computed from the date of installation.

1518. The purpose of a localiser is to
- locate lost airplanes
  - set the airplane on the proper approach angle to the runway
  - indicate the distance the airplane is from the end of the runway
  - align the airplane with the center of the runway.\*
1519. An antenna is a special type of electrical circuit designed to radiate and receive
- Electromagnetic energy \*
  - Audible signals
  - Visual signals
  - Subharmonic frequencies.
1520. A DME antenna should be located in a position on the aircraft that will
- not be blanked by the wing when the aircraft is banked \*
  - allow an antenna functional check to be made on the ground without a DME test set
  - permit interruptions in DME operation
  - eliminate the possibility of the DME locking on a station.
1521. When bending coaxial cable, the bend radius should be at least
- 5 times the diameter of the cable
  - 10 times the diameter of the cable \*
  - 15 times the diameter of the cable
  - 20 times the diameter of the cable.
1522. When installing a DME antenna, it should be aligned with the
- angle of decalage
  - null position
  - angle of incidence
  - center line on the airplane.\*
1523. The addition of avionics and associated antenna systems forward of the C.G. limit will affect
- empty weight and useful load \*
  - C.G. limits and useful load
  - useful load and maximum gross weight
  - maximum gross weight and datum.
1524. Which system on aircraft uses to communicate with ground control ?
- VOR receiver
  - ADF
  - VHF transceiver \*
  - HF transmitter.
1525. The probe of a capacitance-type fuel level gauge is essentially a
- float-actuated variable condenser
  - condenser with fuel and air action gas one plane
  - condenser with fuel and air acting as a dielectric\*
  - float-actuated variable resistor.
1526. The capacitance type (electronic type) fuel quantity indicator
- has no moving parts in the tank \*
  - has two tubes separated by a mica dielectric in the tank
  - is not accurate when fuel temperature exceeds 100°F
  - measures the amount of the fuel in each tank and reads in gallons.
1527. The type of remote-reading fuel quantity indicating system which has several probes installed in each fuel tank is
- Mechanical
  - Electromechanical
  - Electronic \*
  - Direct reading.
1528. The aircraft fuel quantity indicating systems which incorporates a signal amplifier is
- Electronic \*
  - Sight glass
  - Mechanical
  - Electrical.
1529. A drip guage can measure
- the amount of fuel in the tank \*
  - fuel selector valve leakage
  - system leakage with the system shut down
  - fuel pump diaphragm leakage.
1530. The electronic-type fuel quantity indicating system consists of a bridge circuit,
- an amplifier, an indicator, and a tank unit \*
  - a tank, an amplifier, and an indicator
  - a tank unit, a tank, and an amplifier
  - an indicator, a tank unit, and a tank.
1531. A probe or a series of probes is used in
- magnesyn
  - Seleyne
  - Capacitor \*
  - Synchro.
1532. Why is the electronic-type fluid quantity indicating system is more accurate in measuring fuel level ?
- It measures in gallons and converts to pounds
  - Only one probe and one indicator are necessary for multiple tank configurations.
  - Aircraft attitude has no effect on fluid quantity indication
  - It measures by weight instead of gallons.\*
1533. One advantage of electrical and electronic fuel quantity indicating systems is that
- the indicators are calibrated in gallons therefore, no conversion is necessary
  - only one transmitter and one indicator are needed regardless of the number of tanks
  - several fuel tank levels can be read on one indicator.\*
  - once calibrated, no further adjustment or calibration is required.

#### **ELECTRICAL AIRCRAFT INSTRUMENTATION**

1525. The probe of a capacitance-type fuel level gauge is essentially a
- float-actuated variable condenser
  - condenser with fuel and air action gas one plane
  - condenser with fuel and air acting as a dielectric\*
  - float-actuated variable resistor.

1534. The dielectric (nonconducting material) of the condenser in a capacitor-type fuel quantity indicating system is
- Outer shell of the condenser
  - Wore coil external to the tank
  - Fuel in the tank
  - Fuel and air (vapour) above the fuel.\*
1535. Temperature affects fuel weight as:
- Cold fuel is heavier per gallon \*
  - Warm fuel is heavier per gallon
  - Temperature has no effect
  - Temperature affects fuel weight at seal level but has no effect at cruising altitude.
1536. One advantage of electrical and electronic fuel quantity indicating systems is that the indicator
- can be located at any distance form the tank \*
  - indicates the fuel quantity for one tank only
  - has no movable devices
  - is always calibrated in gallons, therefore, no conversion is necessary.
1537. When fuel quantity is measured in pounds instead of gallons, the measurement will be more accurate because fuel volume
- varies with temperature change \*
  - remains unchanged when temperature decreases
  - increases when temperature decreases
  - remains unchanged when temperature increases.
1538. An electrical-type fuel quantity system consists of an indicator in the cockpit and a
- float-operated transmitter installed in the tank \*
  - glass or plastic tube placed on the same level as the tank
  - float resting on the surface of the tank
  - float-operated receiver installed in the tank.
1539. In an electronic-type fuel quantity indicating system, the tank transmitter is
- an electric condenser \*
  - a variable resistor
  - an electric amplifier
  - a variable capacitor.
1540. The unit which would be adjusted to change the fuel pressure warning limits is:
- Fuel flowmeter bypass valve
  - Engine fuel pump by pass valve
  - Pressure-sensitive mechanism \*
  - Fuel pressure relief valve.
1541. The unit which is generally used to actuate the fuel pressure warning system is :
- fuel flowmeter
  - pressure-sensitive mechanism \*
  - engine fuel pump by pass valve
  - fuel pressure gauge.
1542. The method used on turbine-powered aircraft to determine when the condition of the fuel is approaching the danger of forming ice crystals is
- Fuel pressure warning
  - Fuel pressure guage
  - Fuel strainer pressure gauge
  - Fuel temperature indicator.\*
1543. The first positive indication that a change-over from one fuel tank to another is needed is given by:
- Fuel pressure warning \*
  - Fuel pressure guage
  - Fuel flowmeter
  - Fuel quantity indicator.
1544. The fuel pressure is taken for the pressure warning signal on most aircraft engines at
- outlet side of the boost pump
  - fuel pressure line of the carburetor \*
  - between the fuel pump and the strainer
  - upstream of the fuel shutoff valve.
1545. In some aircraft with several fuel tanks, the possible danger of allowing the fuel supply in one tank to become exhausted before the selector valve is switched to another tank is prevented by the installation of
- A fuel pressure warning signal system \*
  - A fuel pressure relief valve
  - An engine fuel pump by pass valve
  - A fuel flow meter by pass valve.
1546. The primary purpose of a fuel tank pump is to provide a
- positive system of maintaining the designed minimum fuel supply for safe operation
  - means of visually checking the amount of fuel actually in the tank prior to flight
  - place where water and dirt accumulations in the tank can collect and be drained \*
  - reserve supply of fuel to enable the aircraft to land safely in the event of fuel exhaustion.
1547. Integral fuel tanks used in many large aircraft because they
- reduce fire hazards
  - facilitate servicing
  - minimize leakage
  - reduce weight.\*
1548. Aircraft defueling should be accomplished
- as soon as possible after engine shutdown
  - with the aircraft's communication equipment on and in contact with the tower in case of fire
  - in a hangar where activities can be controlled
  - in the open air for good ventilation.\*
1549. Integral fuel tanks are
- constructed of nonmetallic material
  - readily removed from the aircraft
  - located within the cabin space of an aircraft
  - formed by the aircraft structure.\*

1550. The precautions which must be observed if a gravity-feed fuel system is permitted to supply fuel to an engine from more than one tank at a time is:
- The tank airspaces must be interconnected \*
  - The fuel outlet ports of each tank must have the same cross-sectional area
  - Each tank must have a valve in its outlet that automatically shuts off the line when the tank is empty
  - The tanks must always be serviced with identical amounts of fuel.
1551. The purpose of the baffle plate in a fuel tank is:
- To provide an expansion space for the fuel
  - To resist fuel surging within the fuel tank \*
  - To provide internal structural integrity
  - To prevent fuel overflow during refueling.
1552. Fuel-boost pumps are operated
- for providing a positive flow of fuel to the engine\*
  - during takeoff only
  - primarily for fuel transfer
  - automatically form fuel pressure.
1553. The function of flapper valves used in fuel tanks is:
- To reduce pressure
  - To prevent a negative pressure
  - To serve as variable restrictors
  - To act as check valves.\*
1554. Centrifugal-type boost pumps used in systems of aircraft operating at high altitude because they
- save space by having pumps submerged in this tank
  - are positive displacement pumps
  - supply fuel under pressure to engine driven pump\*
  - permit air to circulate around the motor.
1555. It is necessary to vent all aircraft fuel tanks because it?
- ensures a positive head pressure for a submerged boost pump
  - exhausts fuel vapours
  - limits pressure differential between the tank and atmosphere \*
  - eliminates vapour lock.
1556. The type of fuel-booster pump which requires a pressure relief valve is
- Wobble
  - Concentric
  - Sliding vane \*
  - Centrifugal.
1557. To prevent vapour lock in fuel lines at high altitude some aircraft are equipped with
- Vapour separators
  - direct-injection-type carburetors
  - booster pumps \*
  - vapour resistors.
1558. A fuel temperature indicator is located in the fuel tanks on some turbine powered airplanes to tell when fuel may be
- getting cold enough to form hard ice
  - in danger of forming ice crystals \*
  - getting too cold to burn
  - about to form rime ice.
1559. The type of fuel-boost pump that separates air and vapour from the fuel before it enters the line to the carburetor is the
- diaphragm-type pump
  - gear-type pump
  - centrifugal-type pump \*
  - sliding vane-type pump.
1560. Some electric motors have two sets to field windings wound in opposite directions with the result that the
- speed of the motor can be more closely controlled
  - power output of the motor can be more closely controlled
  - motor can be operated at any speed within its rated range without a change in power output
  - motor can be operated in either direction.\*
1561. The purpose of a growler test is to determine the presence of
- an out-of-round commutator
  - a broken field lead
  - a shorted armature \*
  - none of these.
1562. What happens if a short circuit occurs between the positive armature lead and the field lead of a shunt generator, which has the voltage regulator located in the positive side of the field circuit ?
- The generator voltage will drop to zero
  - The generator will only produce residual voltage
  - The reverse-current cut-out relay will open and remain open until the fault is corrected
  - The generator voltage will increase.\*
1563. The principal advantage of the series-wound d.c. motor is:
- High starting torque \*
  - Suitable for constant speed use
  - Low starting torque
  - Speed slightly higher when unloaded.
1564. If a generator is equipped with a vibrator-type voltage regulator, the actual time the voltage regulator points remain open
- depends on the load carried by the generator \*
  - is controlled by the current limiter point clearance
  - is controlled by the reverse-current cutout relay point clearance
  - is increased when the external load is greater than the generator output.

1565. One cause of generator brush arcing is
- Seating brushes with No. 000 sandpaper
  - Excessive spring tension
  - Carbon dust particles
  - Low spring tension.\*
1566. When can be a.c. generators operated in parallel ?
- Ampere and frequency must be equal
  - Wattage and voltage must be equal
  - Frequency and voltage must be equal \*
  - Ampere and voltage must be equal.
1567. The starting current of a series-wound d.c. motor, in passing through both the field and armature windings, produces a
- low starting torque.
  - speed slightly higher when unloaded
  - high starting torque \*
  - force for constant speed.
1568. The motor which would be most likely to have an armature brake is
- Starter motor
  - Landing light retraction motor \*
  - Inverter drive motor
  - Anticollision beacon operating motor.
1569. The method most often used in overcoming the effect of armature reaction is through the use of
- inter poles \*
  - ALNICO field pieces
  - shaded poles
  - dum wound armature in combination with a negatively connected series field.
1570. The only practical method of maintaining a constant voltage output from an aircraft generator under varying conditions of speed and load is to vary the
- strength of the magnetic field \*
  - number of conductors in the armature
  - speed at which the armature rotates
  - brush pressure on the commutator segments.
1571. The pole piece or shoes used in a d.c. generator are part of the
- commutator assembly
  - armature assembly
  - field assembly \*
  - brush assembly.
1572. The number of cycles of a.c. voltage produced in a six-pole alternator of the revolving field type for each revolution of the rotor is:
- Four
  - Five
  - Three \*
  - Six.
1573. If the reverse-current cut-out relay contact points fail to open after the generator output has dropped below battery potential, current will flow through the generator armature
- in the normal direction and through the shunt field opposite the normal direction
  - and the shunt field opposite the normal direction
  - and shunt field in the normal direction
  - opposite the normal direction and through the shunt field in the normal direction.\*
1574. The magnetic brake are used to stop rotation of an electric motor armature because
- Centrifugal force releases a rotating brake cog from a stationary notch when the armature reaches a certain speed and magnetic force re-engages the cog when the electrical power is turned off.
  - A friction brake is applied by a magnet and release by a spring
  - A friction brake is applied by a spring and released by a magnet.\*
  - A brake winding is installed in the rotating armature to cause a more rapid collapse of the magnetic flux lines when the electric power is turned off.
- ELECTRICAL AIRCRAFT SYSTEM**
1575. In a generator, any possible sparking to the brush guides caused by the movement of the brushes within the holder is eliminated by
- the brush pigtail \*
  - brush spring tension
  - undercutting the mica on the commutator
  - lubricating the brush sides.
1576. A series-wound d.c. electric motor will normally required
- more current at high *r.p.m.* than at low *r.p.m.*
  - approximately the same current throughout its operating range of speed
  - more current at low *r.p.m.* than at high *r.p.m.* \*
  - None of the above because a series-wound motor is practical for operation only with alternating current.
1577. The effect of armature reaction (the amount that the neutral plane shifts) is proportional to
- the strength of the stationary field
  - the voltage output of the generator
  - the speed (*r.p.m.*) of the generator
  - the load on the generator.\*
1578. Why must aluminum wire be stripped very carefully ?
- High resistance will develop in stripping nicks
  - Low resistance will develop in stripping nicks.
  - Stripping nicks will cause short circuits in wire runs.
  - Individual strands will break easily after being nicked.\*
1579. The purpose of a commutator in a d.c. motor is:
- To allow the transfer of current by converting it
  - To reverse the current in the field coils at the current flow in the same direction in all conductors under a given pole
  - To provide a means of transferring mechanical energy
  - To reverse the current in the coil just at the time the coil becomes parallel to the lines of force.\*
1580. The purpose of an ammeter in a battery charging system is for indicating the
- amperage available for use
  - total amperes being used in the airplane
  - rate of current used to charge the battery \*
  - electrical potential of battery.

1581. Which of the following is not one of the purposes of interpoles in a generator ?
- Counteract field distortion
  - Reduce field strength \*
  - Overcome armature reaction
  - Reduce arcing at the brushes.
1582. What is the procedure for testing of generator of motor armature windings for opens ?
- Place armature in a growler and connect a 110 V test light on adjacent segments; lights should light\*
  - Check adjacent segments on commutator with an ohmmeter on the high resistance scale
  - Use a 12/24 V test light between the armature core segments and the shaft
  - Use a 110 V test light between the armature core segments and the shaft.
1583. The nominal current rating of an aircraft switch is normally stamped on the
- switch housing \*
  - face plate
  - inside of the switch
  - nonmetallic housing.
1584. The depth to which the mica insulation between the commutator bars of a d.c. generator undercut is
- One-half the width of the mica
  - Equal to twice the width of the mica
  - Equal to the width of the mica \*
  - Never undercut.
1585. How does a voltage regulator control generator output?
- Introducing a resistance in generator-to-battery lead in the event of overload.
  - Shorting out field coil in the event of overload
  - Varying current flow to generator field coil \*
  - Motorising generator to oppose its action.
1586. Aircraft operation at night must be equipped with position lights that meet the minimum requirements specified by the
- safety control regulations
  - air safety regulations
  - Federal Aviation Regulations \*
  - air transportation board.
1587. The type of d.c. generator is not used as an airplane generator is:
- externally grounded
  - internally grounded
  - series wound \*
  - compound wound.
1588. The type of ammeter used to measure radio frequency alternating current is:
- half-wave bridge type
  - full-wave bridge type
  - thermocouple type \*
  - emitter-base type.
1589. The most accurate type of frequency measuring instrument is:
- Integrated circuit chip having a clock circuit.\*
  - Electro-dynamometers using electro-magnetic fields
  - Electromagnets using one permanent magnet
  - Repulsion-type, moving-vane meter.
1590. During ground operation, how is a starter-generator normally cooled ?
- Ram air
  - Engine bleed air
  - An integral fan \*
  - The environmental system cooled air.
1591. During flight operation, how a starter-generator is cooled ?
- The environmental system cooled air
  - An integral fan and ram air \*
  - Engine bleed air
  - An external motor-driven fan.
1592. The function of a rectifier is
- To change direct current into alternating current
  - To step up voltage
  - To change alternating current into direct current.\*
  - To reduce voltage.
1593. The type of instrument used for measuring very high values of resistance is:
- Megohmmeter \*
  - Shunt-type ohmmeter
  - Thermocouple
  - Multimeter.
1594. A diode to be checked for an open circuit or a short circuit. It should be
- in the circuit
  - checked with a milliamp ammeter
  - disconnected from the circuit \*
  - checked from positive to negative only.
1595. The type of rectifier used to change alternator output to direct current is
- Carbonpile
  - Single phase, half wave
  - Three phase, full wave, solid-state \*
  - Sodium-filled, semi-conductor.
1596. It is necessary to observe caution when handling a high-voltage capacitor in an electrical circuit because
- A capacitor may emit toxic gases if not properly ventilated
  - The polarity of the plates may be reversed by improper attachment of an ohmmeter
  - A capacitor may lose its ability to hold charge if intentionally discharged.
  - A capacitor may retain its charge after power is removed.\*



1597. The type of capacitor which can be checked with an ohmmeter to determine its condition is
- extremely low-capacity capacitor
  - sodium filled capacitor
  - electrolytic capacitor \*
  - dielectric capacitor.
1598. If a transformer winding has some of its turns shorted together, it can be determined by observing that
- the output voltage will be high
  - the transformer will not function
  - the transformer will get hot in normal operation \*
  - None of these.
1599. The two general types of a.c motors used in aircraft systems are :
- Induction and Synchronous \*
  - Shaded pole and Universal
  - A.C. series and Capacitor-start
  - Rheostat-series and condenser-start.
1600. The splices can be arranged if several are to be located in an electrical wire bundle as:
- Staggered along the length of the bundle \*
  - Grouped together
  - Enclosed in a conduit
  - It is not permissible to splice aircraft wiring.
1601. The minimum bend radii for an electrical wire bundle is:
- Ten times the outside diameter of the bundle \*
  - Five times the outside diameter of the bundle
  - Fifteen times the outside diameter of the bundle
  - Twenty times a diameter of the largest wire in the bundle.
1602. The voltage output of an alternator may be regulated by controlling the
- speed of the alternator
  - voltage output of the d.c. exciter \*
  - resistance in the rotor windings
  - exciter frequency.
1603. If several long lengths of electrical cable are to be installed in rigid conduit, the possibility of damage to the cable as it is pulled through the conduit will be reduced by
- dusting the cable with powdered graphite
  - dusting the cable with powdered soapstone \*
  - blowing powdered graphite into the conduit runs before installation of the cables
  - the application of a light coat of oil or grease.
1604. Grounding is electrically connecting a conductive object to the primary structure so as to
- prevent current return paths
  - prevent stability of radio transmission and reception
  - allow accumulation of static charge
  - prevent development of radio frequency potential\*
1605. The components used to bond non-continuous stainless steel aircraft components are :
- Printed circuits
  - Stainless steel jumpers
  - Copper jumpers \*
  - Aluminium jumpers.
1606. The rating of aircraft fuse capacity is in
- volts
  - ohms
  - amperes \*
  - microfarads.
1607. The inadvertent operation of a switch can be prevented by
- Mounting a suitable guard over the switch \*
  - Installing a derated spring-loaded toggle switch
  - Installing circuit breakers as a switch
  - Installing a low amperage fuse across the contacts.
1608. It is important to prevent oil canning in electrical junction box sides because it is necessary to
- aid in the installation of terminal strips
  - prevent internal short circuit \*
  - provide space for relay switches.
  - provide space for wire ties and c/A.
1609. During inspection of the terminal strips of an aircraft electrical system, it should be determined that
- only locknuts have been used for terminal attachment to the studs
  - the terminal studs are anchored against rotation\*
  - the heat rise at any single terminal stud does not exceed 120°F above ambient temperatures
  - only plain nuts and lockwashers have been used for terminal attachment to the studs.
1610. What protection to wires and cables does conduit provide when used in aircraft installations ?
- Electromagnetic
  - Thermal
  - Mechanical \*
  - Structural.
1611. Which of the following should be avoided in conduit installation ?
- Support the conduit to prevent chafing against the structure
  - Provide drainholes at the lowest point in a conduit run
  - Locate conduit to provide a footstep or handhold for personnel \*
  - Drilling burrs should be carefully removed.
1612. Electrical wiring installed in aircraft without special enclosing means is called
- master wiring
  - open wiring \*
  - stranded wiring
  - non-conductive wiring.

1613. If the (+) terminal of a voltmeter is connected to the (-) terminal of the source voltage and the (-) terminal of the meter is connected to the (+) terminal of the source voltage, the voltmeter will read
- high voltage
  - correctly
  - low voltage
  - backwards.\*
1614. The nominal rating of electrical switches refers to continuous
- voltage rating with the contacts open
  - current rating with the contacts open
  - voltage rating with the contacts closed
  - current rating with the contacts closed.\*
1615. The material used in the construction of aircraft electrical junction boxes in fire zone is
- fireproof aluminum
  - asbestos
  - cadmium-plated steel
  - stainless steel.\*
1616. The conduit which is normally used to minimise radio interference is
- Flexible brass \*
  - Flexible aluminum
  - Rigid steel
  - Rigid aluminum.
1617. What are the primary considerations when selecting electric cable size ?
- Current-carrying capacity and allowable voltage drop \*
  - The voltage and amperage of the load it must carry
  - The cable location and normal operating temperature
  - The system voltage and cable length.
1618. How are electric circuits protected from over-heating?
- Thermocouples
  - Shunts
  - Fuses \*
  - Solenoids.
1619. The routing of coaxial cables differs from the routing of electrical wiring as:
- Coaxial cable are routed parallel with stringers or ribs.
  - Coaxial cable are routed at right angles to stringers or ribs
  - Coaxial cables must not be clamped
  - Coaxial cables are routed as directly as possible.\*
1620. The aluminium electrical cable sizes which would be selected to replace a No. 10 copper electrical cable is
- No. 4
  - No. 6 \*
  - No. 8
  - No. 10.
1621. Which of the following statements relating to electric wiring is true ?
- When attaching a terminal to the end of an electric cable, it should be determined that the strength of the cable-to-terminal joint is at least twice the tensile strength of the cable
  - When splicing an electric cable in a location subjected to extreme vibration, it is generally recommended that solder splices be used
  - When attaching a terminal to the end of an electric cable, it should be determined that the strength of the cable-to-terminal joint is at least equal to the tensile strength of the cable itself \*
  - All electric cable splices should be covered with soft insulating tubing (spaghetti) for mechanical protection against external abrasion.
1622. For which value are bonding connections tested ?
- resistance value \*
  - amperage value
  - reactance
  - voltage value.
1623. A voltmeter is connected in
- series with the source
  - parallel with the load \*
  - series with the load
  - series-parallel with the source.
1624. If it is necessary to use an electrical connector where it may be exposed to moisture, the mechanic should
- coat the connector with grease
  - use a special moisture-proof type \*
  - wrap the connector with waxed paper
  - spray the connector with varnish or zinc chromate.
1625. The aircraft components are bonded because it is necessary
- To allow electrical charges to move through the aircraft structure without causing sparks \*
  - To prevent electrical charges from moving through the aircraft structure
  - To maintain the electrostatic charge of the aircraft equal to that of the surrounding atmosphere
  - To allow the electrostatic charge of the aircraft to dissipate before it contacts the ground after flight.
1626. The advantage of a circuit breaker when compared to a fuse is :
- Never needs replacing
  - Responds faster to over load
  - always eliminates the need of a switch
  - Resettable and reusable.\*
1627. The advantage of a current limiter is :
- It breaks circuit quickly
  - It can be reset easily
  - It is easily replaced
  - It will take overload for a short period.\*

1628. Where electric cables must pass through holes in bulkheads, formers, ribs, firewalls, etc., the wires should be protected from chafing by
- wrapping with tape
  - using a rubber grommet \*
  - several coats of varnish
  - wrapping with plastic.
1629. In aircraft electrical systems, automatic reset circuit breakers
- should not be used as circuit protective devices\*
  - are useful where only temporary overloads are normally encountered
  - need not be made accessible to crewmembers in flight
  - must be used in all circuits essential to safe operation of the aircraft.
1630. The throw of a single-pole, double-throw switch (SPDT) indicates
- the number of circuits each pole can complete through the switch \*
  - the method of actuating the switch (push-pull, laterally, vertically, etc.)
  - the number of terminals at which current can enter or leave the switch
  - the number of places at which the operating device (toggle, plunger, etc.) will come to rest and at the same time open or close a circuit
1631. An important factor in selecting aircraft fuses is:
- The current exceeds a predetermined value
  - The voltage rating should be lower than the maximum circuit voltage
  - The inner strip of metal is made of an alloy of tin and bismuth
  - Capacity matches the needs of the circuit.\*
1632. The function of circuit breaker in the instrument lighting system is to protect the
- lights from too much current
  - wiring from too much current \*
  - wiring from too much voltage
  - lights from too much voltage.
1633. An ohmmeter is used to check the continuity of a circuit. The ohmmeter would read infinity if
- The resistance in the circuit has become practically zero
  - A separation in the wire has caused a short circuit
  - The circuit is shorted to ground
  - The circuit is open.\*
1634. A voltmeter and an external shunt ammeter are to be installed. The ammeter should be placed in
- series with the shunt, the shunt in series with circuit, and the voltmeter in parallel with the circuit
  - parallel with the shunt, the shunt in series with circuit, and the voltmeter in series with the circuit
  - series with the shunt, the shunt in series with circuit, and the voltmeter in series with the circuit
  - parallel with the shunt, the shunt in series with circuit, and the voltmeter in parallel with the circuit.\*
1635. The range switch on a multimeter is set on 300 mA. How much current is the meter indicating if the needle is pointing to 1.85 on a scale of zero to three ?
- 0.185 A \*
  - 1.85 A
  - 1.85 mA
  - 18.5 mA.
1636. Before using an ohmmeter to check for open or short circuits, it is necessary to
- activate the circuit to be checked
  - never short the ohmmeter leads together
  - isolate the circuit to be checked \*
  - set the ohmmeter to infinity.
1637. The precaution to be followed a multimeter is :
- Do not store near a power source
  - Do not store near a permanent magnet
  - Keep lead probes from touching
  - select function switch in other than ohm position\*
1638. When a multimeter is used to measure resistance, a range is selected which will
- read on lower half of scale
  - prevent pointer from fluctuating
  - allow meter to be adjusted to zero
  - read on upper half of scale.\*
1639. Capacitors connected in series can be combined in the same manner as
- resistance in series
  - conductors in series
  - farads in parallel
  - resistance in parallel.\*
1640. In a D'Arsonval ammeter, the amount of current required to turn the meter pointer to fullscale deflection depends on the
- magnet strength and number of turns of wire in the moving coil \*
  - strength of the balance springs and the size of wire in the moving coil
  - strength of the balance springs
  - magnet strength and zero adjustment.
1641. In a parallel d.c. circuit the current flow in any one resistor is equal to
- the current flow in any other part of the circuit
  - the sum of the currents in the other parallel resistors
  - the total current flow
  - the total current flow minus the sum to the currents in the other parallel resistors.\*
1642. Which of the following principles is not true in reference to a parallel electrical circuit ?
- The total resistance is less than the smallest individual resistor
  - The total resistance will decrease as additional parallel resistors are added
  - The total resistance is equal to the sum of the individual resistors \*
  - The total resistance will increase if one or more of the parallel resistors is removed.

1643. What is an advantage of using a.c. electrical power in aircraft ?
- A.C. electrical motors can be reversed while d.c. motors cannot
  - Self-induction due to voltage change contributes to the effective power, thus causing the power, output to be 1.707 times the power input
  - Greater ease in stepping the voltage up or down.\*
  - The effective voltage is 1.41 times the maximum instantaneous voltage; there fore, less power input is required.
1644. Aircraft position lights consist of at least three lights. What are their colour and location ?
- White in front, red in the rear, and green midway on the aircraft centerline
  - Red on the left, green on the right, and white on the rear \*
  - Green in front, red in the rear, and while midway on the aircraft centerline
  - Red on the right, green on the left, and white in the rear.
1645. The iron cores of most induction coils are laminated in order to
- reduce the core reluctance
  - increase the core permeability
  - reduce the effects of eddy currents \*
  - reduce the production of weak areas and strong areas on the core faces.
1646. Certain transport aircraft use a.c. electrical power for all normal operation and battery furnished d.c. electrical power for stand by emergency use. In aircraft of this type that operate no d.c. generators, the batteries are kept charged by
- inverters which use the aircraft's a.c. generators as a source of power
  - a.c. current directly from the aircraft's generators
  - alternators which use the aircraft's a.c. generators as a source of power
  - rectifiers which use the aircraft's a.c. generators as a source of power.\*
1647. The voltage in an a.c. transformer secondary that contains twice as many laps as the primary will be
- greater and the amperage less than in the primary\*
  - greater and the amperage greater than in the primary
  - less and the amperage greater than in the primary
  - less and the amperage less than in the primary.
1648. If the positive field between a generator and a generator control panel breaks and is shorted while the engine is running, a voltmeter connected to generator output would indicate
- zero voltage
  - residual voltage \*
  - normal voltage
  - slightly below normal voltage.
1649. A method used for restoring generator field residual magnetism is :
- Flash the fields \*
  - Demagnetise the commutator
  - Reseat the brushes
  - Energise the armature.
1650. One of the chief advantages of alternating current is that it can be transmitted at a high voltage with a low power loss. The voltage can then be changed to any desired value of
- d.c. by means of inverters
  - d.c. by means of transformers
  - a.c. by means of inverters
  - a.c. by means of transformers.\*
1651. Which of the following must be accomplished when installing an anticollision light ?
- Connect the light to the primary electrical bus
  - Install a switch independent of the position light switch \*
  - Use shielded electrical cable to assure failsafe operation
  - Connect the anticollision light to the aircraft position light switch.
1652. The inductor-type inverter output voltage is controlled by the
- number of poles and the speed of the motor
  - voltage regulator
  - d.c. stator field current \*
  - a.c. armature coils.
1653. While using an ohmmeter to check the continuity of a generator field coil, the coil should
- be removed from the generator housing
  - show high resistance when the meter prods are connected to be terminals of the coil
  - be heated to operating temperature
  - show very low resistance if it is a series field coil.\*
1654. The strength of the core of an electromagnet depends upon the material from which it is constructed the which of the two other factors ?
- The number of turns of wire in the coil and the applied voltage
  - The size (cross section ) of the wire and the amount of current (amperes) passing through the coil.
  - The number of turns of wire in the coil and the amount of current (amperes) passing through the coil \*
  - The size (cross section) and the number of turns of wire in the coil and the applied voltage.
1655. How does a voltage regulator control generator voltage?
- By changing the resistance in the generator output circuit
  - By changing the residual magnetism of the generator
  - By changing the current in the generator output circuit
  - By changing the resistance of the generator field circuit.\*

1656. The overvoltage control automatically protects the generator system when excessive voltage is present by
- opening the shunt circuit \*
  - opening and resetting the field control relay
  - breaking a circuit to the trip coil of the field control relay
  - closing the generator switch circuit.
1657. When d.c. generators are operated in parallel to supply power for a single load, their controls include an equalizer circuit to assure that all generators share the load equally. The equalizer circuit operates by
- switching all new electrical loads to the low generator to maintain an equal load division among the generators.
  - increasing the output of the low generator to equal the output of the high generator
  - decreasing the output of the high generator to equal the output of the low generator
  - increasing the output of the low generator and decreasing the output of the high generator until they are equal.\*
1658. Which of the following is considered to be an intermittent duty circuit ?
- Anticollision light circuit
  - Landing light circuit\*
  - Instrument panel light circuit
  - navigation light circuit.
1659. The most common method of regulating the voltage output of a compound d.c. generator is to vary the
- current flowing through the shunt field coils \*
  - total effective field strength by changing the reluctance of the magnetic circuit
  - resistance of the series field circuit
  - number of rotating conductors being affected by the field flux.
1660. Upon completion of the landing gear extension cycle, the green light illuminated and the red light remained lit. The probable cause is :
- Short in the down limit switch
  - Short in the gear safety switch
  - Short in the up limit switch \*
  - Short in the nose gear down switch.
1661. The instrument panel voltmeter indicates 10V to 15V in a 24-V system with a properly adjusted voltage regulator. The trouble is most likely in the
- reverse current cutout \*
  - generator circuit
  - Battery circuit
  - inverter.
1662. The direction of rotation of a d.c. electric motor can be changed by
- Interchanging the wires which connect the motor to the external power source
  - Reversing the electrical connections to either the field or armature windings \*
  - Rotating the brush assembly 90°
  - Removing the starting winding.
1663. Aircraft which operate only a.c. generators (alternators) as a primary source of electrical power normally provide current suitable for battery charging through the use of
- A stepdown transformer and a rectifier \*
  - A network of condensers and choke coils to filter the alternating current with negligible power loss
  - An inverter and a voltage-dropping resistor
  - A dynamotor with a half-wave d.c. output.
1664. On installations requiring alternating current from the battery-generator system, it is necessary to have
- a transformer
  - two or more generators
  - an inverter \*
  - a variable resistor between the battery and generator.
1665. What is relay ?
- A magnetically operated switch \*
  - A device which increases voltage
  - A device which converts electrical energy to heat energy
  - Any conductor which receives electrical energy and passes it on with little or no resistance.
1666. The purpose of rectifier in an electrical system is to change
- the frequency of alternating current
  - the voltage of alternating current
  - the voltage and amperage of alternating current
  - alternating current to direct current.\*
1667. The ratio of turns between the primary coil winding and the secondary coil winding of a transformer designed to triple its input voltage would be as :
- Primary will have one-third as many turns as its secondary \*
  - Primary will have one-half as many turns as its secondary
  - Primary will have twice as many turns as its secondary
  - Primary will have three times as many turns as its secondary.
1668. In an a.c. circuit with no phase lead or lag
- Real power is zero
  - Reactive power is maximum
  - Real power is greater than apparent power
  - Real power equals apparent power.\*
1669. The rating of generators is in
- Watts at rated voltage
  - Farads at rated voltage
  - Amperes at rated voltage \*
  - The impedance at rated voltage.
1670. A shunt wound d.c. generator is connected as :
- One field is shunted across the other
  - Both fields are shunted across the armature \*
  - The field and armature are shunted with a capacitor
  - The armature and fields are shunted by a variable resistor.

1671. The poles of a generator are laminated to
- reduce hysteresis losses
  - reduce flux losses
  - increase flux concentration
  - reduce eddy current losses.\*
1672. The frequency of an alternator depends upon
- Voltage
  - RPM \*
  - Current
  - Wattage rating.
1673. Where is the generator rating usually found stamped on ?
- Firewall
  - Generator \*
  - Engine
  - Cowling.
1674. Residual voltage is a result of
- magnetism in the field windings
  - current flow in the field coils
  - magnetism in the field shoes \*
  - magnetism in the armature.
1675. Three resistors of 3 ohm, 10 ohm, and 15 ohm are connected in parallel in a 30 V circuit. The current will that flow through the 3-ohm resistor is:
- 30 A
  - 10 A \*
  - 6 A
  - 2A.
1676. A 24 V source is required to furnish 48 W to a parallel circuit consisting of two resistors of equal value. The value of each resistor is
- 20 ohm
  - 24 ohm \*
  - 12 ohm
  - 10 ohm.
1677. Which of the following is not one of the three methods by which an electromotive force can be induced in a conductor using the principle of electromagnetic induction ?
- Varying the speed of a conductor moving parallel to the lines of force of a stationary magnet \*
  - Moving a magnet so that its lines of force cut across a stationary conductor
  - Moving a conductor so that it cuts across the lines of force of a stationary magnet
  - Varying the strength of stationary magnet so that its lines of force cut across a stationary conductor.
1678. A 24 V source is required to furnish 48 W to a series circuit consisting of two resistors of equal value. The value of each resistor is
- 2 ohm
  - 6 ohm \*
  - 12 ohm
  - 24 ohm.
1679. The unit of power used in d.c. electrical circuits is
- Ampere
  - volt
  - Joule
  - Watt.\*
1680. An electric cabin heater draws 20 A at 110 V. The current that will flow if the voltage is reduced to 90V is :
- 1.64 A
  - 5.5 A
  - 16.4 A \*
  - 14.5 A.
1681. The resistance of a conductor can be decreased by
- Increasing the length or decrease the cross-sectional area
  - Decreasing the length or increase the cross-sectional area \*
  - Decreasing the length or the cross-sectional area
  - Increasing the length or the cross-sectional area.
1682. If a 12 V circuit furnish 3 A to a parallel circuit consisting of three equal resistor. The value of each resistor will be
- 12 ohm \*
  - 4 ohm
  - 1.33 ohm
  - cannot be determined from the information given.
1683. A simple circuit has three parallel resistors of 5 ohm, 10 ohm, and 17 ohm. If the measured voltage across the 17-ohm resistor is 25 V. The current that will flow through the 5-ohm resistor will be
- 8.97 A
  - 1.47 A
  - 5 A \*
  - cannot be figured from the information given.
1684. In a circuit having an increasing resistance with a constant voltage, the current flow will
- be directly proportional
  - increase
  - decrease \*
  - be constant.
1685. In a parallel circuit, most current flow will be through the branch with the
- least voltage
  - greatest voltage
  - least resistance \*
  - greatest resistance.
1686. An electric cabin heater draws 15 A at 110 V. If the voltage is reduce to 95 V, the current will be
- 13.0 A \*
  - 1.30 A
  - 7.3 A
  - 73.0 A.
1687. The purpose of skid detectors is :
- To reduce brake drag
  - To aid in effective braking \*
  - To reduce hydraulic pressure
  - To indicate the tires are skidding.
1688. The rotor in an autosyn remote indicating system employs
- an electromagnet \*
  - a permanent magnet
  - an electromagnet and a permanent magnet
  - neither an electromagnet or a permanent magnet
1689. What is the basic difference between an autosyn and a magnesyn indicating system ?
- Rotor \*
  - Transmitter
  - Receiver
  - Winding.
1690. The rotor in a magnesyn remote indicating system employs
- a permanent magnet \*
  - an electromagnet
  - an electromagnet and a permanent magnet
  - neither an electromagnet nor a permanent magnet.

1691. One check necessary for proper operation of a pitot/static tube heater after replacement is :
- Ammeter reading \*
  - Voltmeter reading
  - Visual inspection of all connections
  - Continuity check or system.
- INSTRUMENTATION**
1692. The type of instrument indicating system that is used in fuel flow system in large airplanes is usually.
- a direct reading system
  - an autosyn system \*
  - a synchro resolver system
  - a servomechanism system.
1693. The current required to operate an aircraft autosyn fuel-flow indicating system is
- direct current
  - pulsating current
  - alternating current \*
  - pulsating voltage.
1694. Fuel-flow transmitters are designed to transmit data
- mechanically
  - electrically \*
  - visually
  - fluidly.
1695. The fuel-flow transmitter converts the fuel flow into an electrical signal which represents the rate of fuel flow in pounds per hour. It then transmits the signal to
- a receiver device on the instrument panel \*
  - the fuel quantity gauges
  - the control valve on the fuel control regulator
  - the bypass valve solenoid on the fuel control regulator.
1696. The unit which most accurately indicates fuel consumption of an internal combustion engine is :
- Fuel quantity gauge
  - Fuel totalizer
  - Electronic fuel quantity indicator
  - Fuel flowmeter.\*
1697. A ratiometer-type oil temperature indicator moves off-scale on the high side of the dial as soon as the master switch is turned. The most probable trouble is :
- A short in the power circuit
  - An open in the power circuit \*
  - An open in the power circuit
  - A short in the bulb circuit.
1698. Which mechanism drives the fuel-flow indicator needle?
- A fiction clutch on the motor shaft
  - Mechanical gear train
  - A direct coupling to the motor shaft \*
  - A magnetic linkage.
1699. The function of an engine analyser
- to measure the fuel/air ratio being burned in the cylinders
  - to monitor the temperature of exhaust gases
  - to measure specific fuel consumption
  - to detect ignition system faults.\*
1700. The function of a manifold pressure gauge is :
- to maintain constant pressure in the intake manifold
  - to indicate differential pressure between the intake manifold and atmospheric pressure
  - to indicate variations of atmospheric pressure at different attitudes
  - to indicate absolute pressure in the intake manifold.\*
1701. The function of an exhaust gas analyser is to indicate the
- brake specific fuel consumption
  - fuel/air ratio being burned in the cylinders \*
  - temperature of the exhaust gases in the exhaust manifold
  - grade of fuel being used.
1702. The type of electric motors commonly used in electric tachometers are :
- Direct current, series-wound motors
  - Synchronous motors \*
  - Direct current, shunt-wound motors
  - Direct current, compound-wound motors.
1703. The hot and cold junctions in an engine cylinder temperature indicating system are located at
- both junctions are located at the instrument
  - both junctions are located at the cylinder
  - the hot junction is located at the cylinder and the cold junction is located at the instrument \*
  - the cold junction is located at the cylinder and the hot junction is located at the instrument.
1704. The indicator of a tachometer system is responsive to change in:
- current flow
  - voltage polarity
  - frequency \*
  - voltage value.
1705. A thermocouple-type temperature indicating instrument system
- is a balanced-type, variable resistor circuit
  - requires no external power source \*
  - usually contains a balancing circuit in the instrument case to prevent fluctuations of the system voltage from affecting the temperature reading
  - will not indicate a true reading if the system voltage varies beyond the range for which it is calibrated.
1706. In a thermocouple-type cylinder head temperature measuring system
- the resistance required for cylinder head temperature indicators is measured in farads
  - the voltage output of a thermocouple system is determined by the temperature difference between the two ends of the thermocouple \*
  - if a resistor is installed in a thermocouple lead, it is placed in the positive lead
  - when the master switch is turned on, a thermocouple indicator will move offscale to the low side.

1707. The basic meter used to indicate cylinder head temperature in most aircrafts is :
- Iron-vane meter
  - Electrodynamometer
  - Galvanometer \*
  - Thermocouple-type meter.
1708. Which of the following is a primary engine instrument?
- Tachometer \*
  - Torque meter
  - Fuel flowmeter
  - Airspeed indicator.
1709. A complete break in the line between the manifold pressure gauge and the induction system will be indicated by the gauge registering
- prevailing atmospheric pressure \*
  - higher than normal for conditions prevailing
  - lower than normal for conditions prevailing
  - None of these.
1710. Engine oil temperature gauges indicate the temperature of the oil
- entering the oil cooler
  - entering the engine \*
  - in the oil storage tank
  - in the return lines to the oil storage tank.
1711. Helicopters require a minimum of two synchronous tachometer systems because
- One indicates engines RPM and the other tail rotor RPM
  - One indicates main rotor RPM and the other main rotor RPM
  - One indicates engine RPM and the other main rotor RPM \*
  - Only helicopters with turbine engines employing a dual compressor require two systems.
1712. The Thermocouple leads are inadvertently crossed at installation. What would the cylinder temperature gauge pointer indicate ?
- normal temperature for prevailing condition
  - oscillating pointer
  - moves off-scale on the zero side of the meter.\*
  - moves off-scale on the zero side of the meter.
1713. Which instrument is used to check heat sensitive elements and heat sensitive bulb resistance ?
- Wheat stone -bridge meter \*
  - standing wave ratio (SWR) meter
  - thermocouple-type meter
  - megohmmeter.
1714. Cylinder head temperatures are measured by the use of a thermocouple circuit which measures the
- resistance in a metal gasket
  - difference in the resistance between two dissimilar metals used in the circuit between the hot and cold junctions \*
  - difference in the voltage between two dissimilar metal gaskets.
1715. Which statement is true in case of thermocouple leads?
- These may be adjusted in length to fit any installation
  - These may be installed with either lead to either post of the indicator
  - These are designed for a specific installation and may not be altered \*
  - These may be repaired using solderless connectors.
1716. The unit in a tachometer system which sends information to the indicator is :
- The three-phase a.c. generator \*
  - The two-phase a.c. generator
  - The synchronous motor
  - The miniature d.c. motor.
1717. The device used to convert alternating current, which has been induced into the loops of the rotating armature of a d.c. generator, to direct current is:
- An alternator
  - A rectifier
  - A commutator \*
  - An inverter.
1718. A direct current series motor mounted within an aircraft draws more amperes during start than when it is running under its rated load. The most logical conclusion that may be drawn is
- the starting winding is shorted
  - the brushes are floating at operating RPM because of weak brush springs
  - the condition is normal for this type of motor \*
  - hysteresis losses have become excessive through armature bushing (or bearing) wear.
1719. The stationary field strength in a direct-current generator is varied
- by the reverse-current relay
  - because of generator speed
  - because of the number of rotating armature loops available
  - according to the load requirements.\*
1720. The type of electric motor generally used with a direct-cranking engine starter is :
- Direct current, shunt-wound motor
  - Direct current, series-wound motor \*
  - Direct current, compound-wound motor
  - Synchronous motor.
1721. The output frequency of an a.c. generator (alternator) depends upon
- the speed of rotation and the strength of the field
  - the strength of the field and the number of field poles
  - the speed of rotation, the strength of the field, and the number of field poles
  - the speed of rotation and the number of field poles.\*.



1722. There is a high surge of current require when a d.c. electric motor is first started. As the speed of the motor increases
- The counter e.m.f. decreases proportionally
  - the applied e.m.f. increases proportionally
  - the net counter e.m.f. increased until its value is greater than the applied e.m.f.
  - the counter e.m.f. builds up and opposes the applied e.m.f., thus reducing the current flow through the armature.\*
1723. Alternators are often driven by a constant speed drive mechanisms to permit a nearly constant
- voltage output
  - amperage output
  - number of cycles per second \*
  - total power output.
1724. Commutators or slip rings are polished using :
- Fine emery cloth
  - Very fine sand paper \*
  - Crocus cloth or fine oilstone
  - aluminium oxide or garnet paper
1725. If the generator is malfunctioning, its voltage can be reduced to residual by actuating the
- rheostat
  - master solenoid
  - overvoltage circuit breaker
  - master switch.\*
1726. The points in a vibrator-type voltage regulator stick in the closed position while the generator is operating. The probable result will be :
- Generator output voltage will decrease
  - Generator output voltage will not affected
  - Generator output voltage will increase \*
  - The reverse-current cutout relay will remove the generator from the line.
1727. a constant-speed drive is used to control the speed of some aircraft engine-driven generators because
- the voltage output of the generator will remain within limits
  - uncontrolled surges of current to the electrical system are eliminated
  - both voltage and amperage output can be controlled directly
  - the frequency of the alternating current output will remain constant.\*
1728. A short circuit occurs between the positive field lead and the positive armature lead of a generator with the engine operating at cruising RPM. What will be the outcome ?
- The reverse-current cutout relay will not close
  - A high generator voltage \*
  - Failure of the generator to produce any voltage
  - The generator will only produce residual voltage.
1729. Aircraft that operate more than one generator connected to a connected to a common electrical system must be provided with
- Automatic generator switches that operate to isolate any generator whose output is less than 80 percent of its share of the share of the load
  - An automatic device that will isolate non-essential loads from the system if one of the generators fails
  - A generator switch arrangement that will prevent any one generator from being connected to the system unless the other generators are operating
  - Individual generator switches that can be operated from the cockpit during flight.\*
1730. The most effective method of regulating aircraft direct current generator output is to vary, according to the load requirements, the
- strength of the stationary field \*
  - generator speed
  - effective resistance in the load circuit
  - number of rotating armature loops in use.
1731. Aircraft engine starter motors are generally of the type:
- Compound
  - Series \*
  - Differential compound
  - Shunt (parallel).
1732. As the generator load is increased (within its reted capacity), the voltage will
- decrease and the amperage output will increase
  - increase and the amperage output will increase
  - remain constant and the amperage output will increase \*
  - remain constant and the amperage output will decrease.
1733. As the flux density in the field of a d.c. generator increases and the current flow to the system increases
- A force required to turn the generator decreases
  - The generator voltage decreases
  - The generator amperage decreases
  - The force required to turn the generator increases\*
1734. The automatic ignition relight switch is activated on a gas turbine engine by
- a sensing switch located in the tailpipe
  - a decrease in tailpipe temperature
  - a drop in the compressor discharge pressure \*
  - a drop in fuel flow.
1735. The rotor windings of an aircraft alternator usually are excited by
- a constant a.c. voltage from the battery
  - alternating current from a permanent condenser
  - a constant a.c. voltage
  - a variable direct current.\*
1736. The precaution usually taken to prevent electrolyte from freezing in a lead acid battery is :
- Place the aircraft in hangar
  - Remove the battery and place it in a warm area.
  - Keep the battery fully charged \*
  - Drain the electrolyte.

1737. A 140 ampere-hour battery will deliver 15 A for a period of  
 of  
 a. 15.0 hours                      b. 1.40 hours  
 c. 9.33 hours \*                    d. 14.0 hours.
1738. The basic advantage of using a.c. for electrical power for a large aircraft is :  
 a. A.C. systems operate at higher voltage than d.c. systems and therefore use less current and can use smaller and lighter weight wiring.\*  
 b. A.C. systems operate at lower voltage than d.c. systems and therefore use less current and can use smaller and lighter weight wiring  
 c. A.C. systems operate at higher voltage than d.c. systems and therefore use more current and can use smaller and lighter weight wiring  
 d. A.C. systems operate at lower voltage than d.c. systems and therefore are more current and can use smaller and lighter weight wiring.
1739. Two types of a.c. motors that are used to produce a relatively high starting torque are :  
 a. Shaded pole and shunt field  
 b. Shunt field and single phase  
 c. Three-phase induction and repulsion \*  
 d. Single-phase induction and rotating field.
1740. The frequency of most aircraft alternating current is :  
 a. 50 Hertz                          b. 120 Hertz  
 c. 208 Hertz                        d. 400 Hertz.\*
1741. Which of the following aircraft circuits does not contain a fuse ?  
 a. Generator circuit              b. Air-conditioning circuit  
 c. Exterior lighting circuit      d. Starter circuit.\*
1742. The maximum number of a terminals that may be connected to any one terminal stud in an aircraft electrical system is :  
 a. Four \*                              b. One  
 c. Two                                 d. Three.
1743. The maximum number of bonding jumper wires that may be attached to one terminal grounded to a flat surface is :  
 a. Four \*                              b. Five  
 c. Two                                 d. Three.
1744. When installing an electrical switch, under which of the following conditions should the switch be derated from its nominal current rating ?  
 a. Conductive circuits  
 b. Capacitive circuits  
 c. Low rush-in circuits  
 d. Direct-current motor circuits.\*
1745. The resistance of the current return path through the aircraft is always considered negligible, provided the  
 a. Voltage drop across the circuit is checked  
 b. Circuit resistance is checked  
 c. generator is properly grounded  
 d. Structure is adequately bonded.\*
1746. Parallel electrical wires should be twisted on installation when  
 a. it is desired to keep the bundle rigid  
 b. they are not tied in bundles  
 c. it is necessary to reduce the wire diameter  
 d. they are used in the vicinity of a magnetic compass.\*.
1747. Current flow through the coil of a solenoid-operated electrical switch is :  
 a. continually, as long as the aircraft's electrical system master switch is on  
 b. continually, as long as the control circuit is complete \*  
 c. only for a short time period following movement of the control switch  
 d. only until the movable points contact the stationary points.
1748. The lubricant that may be used to aid in pulling electrical wires or cables through conduits is :  
 a. Lightweight, vegetable-base grease  
 b. Powdered graphite  
 c. Soapstone talc \*  
 d. Rubber lubricant.
1749. Bonding jumpers should be designed and installed in such a manner that they  
 a. are not subject to flexing by relative motion of airframe or engine components  
 b. limit the relative motion of the parts to which they are attached by acting as a secondary stop  
 c. provide a low electrical resistance in the ground circuit \*  
 d. prevent buildup of a static electrical charge between the airframe and the surrounding atmosphere.
1750. On a turbine engine, with the starter-generator circuit energised, the engine would not crank. What is the probable cause ?  
 a. overvoltage relay is defective  
 b. throttle ignition switch is defective  
 c. igniter relay is defective  
 d. starter relay is defective.\*
1751. Arcing at the brushes and the burning of the commutator of a motor may be caused by  
 a. weak brush springs \*  
 b. excessive brush spring tension  
 c. smooth commutator  
 d. low-mica.
1752. Switches used to control engine electrical circuits should be installed  
 a. upside down to prevent debris from shorting the terminals  
 b. so the toggle will move in the same direction as the desired motion of the unit controlled  
 c. under a guard  
 d. so the ON position is reached by a forward or upward position.\*

1753. When installing electrical wiring parallel to a fuel line, the wiring should be
- in a metal conduit
  - in a vinyl sleeve
  - above the fuel line \*
  - below the fuel line.
1754. The speed of an eight-pole a.c. generator to produce 400 Hertz a.c. will be
- 400 RPM
  - 1,200 RPM
  - 6,000 RPM \*
  - 12,000 RPM.
1755. The number of basic types of circuit breakers used in power plant installation electrical systems is :
- One
  - Two
  - Three \*
  - Four.
1756. Electrical switches are rated according to the
- voltage and the current they can control \*
  - resistance rating of the switch and the wiring
  - temperature and capacitance rating
  - resistance and the temperature rating.
1757. Electrical circuit protection devices are installed primarily to protect the
- relays
  - switches
  - units
  - wiring.\*
1758. Most electrical terminal strips in an aircraft are the barrier type and are made of a
- strong paper-base phenolic compound \*
  - petrolatum and zinc dust compound
  - layered aluminum impregnated with compound
  - compressed vinyl impregnated with aluminum.
1759. When two or more electrical terminals are installed on a single lug of a terminal strip, the process is called
- stripping
  - stepping
  - stacking \*
  - fanning.
1760. Aircraft electrical wire size is measured according to the
- Military Specification system
  - American Wire Gage system \*
  - Society of Automotive Engineers system
  - Military Standards system.
1761. The majority of the wire used in aircraft electrical systems is stranded copper wire that meets the specifications of :
- MIL-W-7042
  - MIL-W-5606
  - MIL-W-7072
  - MIL-W-5086.\*
1762. The basic unit of measure for capacitance is :
- Henry
  - Gauss
  - Ohm
  - Farad.\*
1763. If the voltage applied across the plates of a capacitor (condenser ) is too high, then
- the plates will become saturated and not accept an electrical charge
  - the dielectric will break down and arcing will occur between the plates \*
  - the induced counter e.m.f. will cause the capacitor to act as a resistor in the circuit
  - it will probably not damage the capacitor because there is no physical connection between the plates; however, it may cause some secondary problems in other parts of the circuit.
1764. In an alternating current circuit, the effective voltage is
- equal to the maximum instantaneous voltage
  - less than the maximum instantaneous voltage \*
  - greater than the maximum instantaneous voltage
  - None of these.
1765. The amount of electric charge a capacitor can store is directly proportional to
- the plate area and inversely proportional to the distance between the plates \*
  - the distance between the plates and inversely proportional to the plate area
  - the plate area and is not affected by the distance between the plates
  - the distance between the plates and is not affected by the plate area.
1766. When capacitors are connected in parallel, the total capacitance is equal to
- the sum of the reciprocals of the capacitances
  - the sum of the capacitances divided by the number of capacitors
  - the reciprocal of the sum of the reciprocals of the capacitances
  - the sum of the capacitances.\*
1767. The result of operating an engine in extremely high temperatures using a lubricant recommended by the manufacturer for a much lower temperature is :
- The oil pressure will be higher than normal
  - The oil pressure gauge will fluctuate excessively
  - The oil temperature and oil pressure will be higher than normal
  - The oil pressure will be lower than normal.\*

#### MATERIALS & RIVETS

1768. The usual cause of runs and sags in aircraft finishes is
- Too much material applied in one coat \*
  - Material drying too fast
  - Material is being applied too fast
  - High atmospheric humidity.
1769. The defect in aircraft finishes may be caused by moisture in the air supply line, adverse humidity, drafts, or sudden changes in temperature is
- Spray dust
  - Spray mottle
  - Blushing \*
  - Sags and runs.

1770. Which statement is true regarding paint system compatibility ?
- Old-type zinc chromate primer may not be used directly for touchup of bare metal surfaces
  - Acrylic nitrocellulose lacquers may be used over old nitrocellulose finishes
  - Old wash primer coats may be overcoated directly which epoxy finishes \*
  - Modified zinc chromate primer will adhere satisfactorily to bare metal.
1771. If a hi-shear rivet is underdriven during installation the
- stud will not expand and fill the drilled hole properly
  - collar will be incompletely swaged into the groove\*
  - shear strength of the rivet will be reduced
  - stem will loosen, resulting in a hollow rivet shank.
1772. Alloy 217 rivets are heat treated
- by the manufacturer and do not require heat treatment before being driven \*
  - by the manufacturer by require reheat treatment before being driven
  - to a temperature of 910°C to 930°C and quenched in cold water
  - to a temperature of 930°C to 950°C and quenched in cold water.
1773. The general rule for finding the proper rivet diameter is
- three times the thickness of the thinnest sheet
  - three times the thickness of the materials to be joined
  - two times the rivet length
  - three times the thickness of the thickest sheet.\*
1774. An identifying characteristic of cellulose acetate plastics is
- Burns with a steady clear flame
  - Rub and blow acetone; it will turn blue
  - When heated or burned, has a very pleasant odor
  - Zinc chloride will turn the plastic milky.\*
1775. Superficial scars, scratches, surface abrasion or rain erosion on fiberglass laminates can generally be repaired by applying
- a piece of resin-impregnated glass fabric facing
  - a surface patch by means of epoxy resin cured for 1 hour with an infrared heat lamp.
  - one or more coats of suitable resin (room-temperature catalyzed) to the surface \*
  - a sheet of cellophane over the abraded surface and one or more coats of resin cured with infrared heat 1A.
1776. When making repairs to fiberglass structures cleaning of the area to be repaired to essential for a good bond. The final cleaning should be made with the help of
- lacquer thinner
  - methyl-ethyl-ketone (MEK) \*
  - soap, water, and a scrub brush
  - a thixotropic agent.
1777. The coefficient of expansion of most plastic enclosure materials is
- greater than both steel and aluminum \*
  - greater than steel but less than aluminium
  - less than either steel or aluminium
  - approximately the same as aluminium.
1778. Cabin upholstery materials installed in current standard category airplanes must
- be fireproof
  - be at least flame resistant \*
  - be approved in accordance with FAR part 61
  - meet the requirements prescribed in FAR Part 43.
- ### STRUCTURES
1779. The purpose of a gusse or gusse plate used in the construction and repair of aircraft structures is
- To hold structural members in position temporarily until the permanent attachment has been completed
  - To provide access for inspection of structural attachments
  - To join and reinforce intersecting members \*
  - To provide a method of adjusting the tension or location of structural components.
1780. Shallow scratches in sheet metal may be repaired by
- burnishing \*
  - buffing
  - stop drilling
  - patching.
1781. The included angle of a twist drill for soft metals should be
- 118°
  - 45°
  - 90° \*
  - 65°.
1782. The minimum spacing for a single row of a aircraft rivets is
- Two times the diameter of the rivet shank
  - Three times the length of the rivet shank
  - One-half the thickness of the material being riveted
  - Three times the diameter of the rivet shank.\*
1783. Clad aluminum alloys are used in aircraft because they
- can be heat treated much easier than the other forms of aluminum
  - are less subject to corrosion than uncoated aluminum alloys \*
  - are stronger than unclad aluminum alloys
  - are lighter than the other forms of aluminum.
1784. Which statement is true regarding a cantilever wing ?
- it employs lift wires instead of lift struts
  - it has nonadjustable lift struts
  - no external bracing is needed \*
  - it requires only one lift strut on each side.
1785. The factor which determines the minimum space between rivets is the
- type of material being riveted
  - length of the rivets being used
  - diameter of the rivets being used \*
  - thickness of the material being riveted.

1786. The included angle of a twist drill for hard metal should be
- 60°
  - 118° \*
  - 90°
  - 100°.
1787. The purpose of a relief hole is
- to lighten the metal
  - to check expansion
  - to relieve stress concentration and prevent cracking.\*
  - to increase the strength.
1788. Monocoque fuselages derive their principal strength from
- bulkheads the longerons
  - longerons and formers
  - the actual covering metal or plywood \*
  - metal stringers.
1789. In making wing skin repairs
- rivet alloy is not a critical item
  - 2024- rivets may be replaced with 2117- T rivets
  - rivets selected should be the same alloy as the material being riveted \*
  - 2117 - T rivets should be heat treated.
1790. Rivet pitch is defined as
- distance between the centers of adjacent rivets in the same row \*
  - distance from the center of the rivet to the edge of the repair
  - countersunk head on flush rivets
  - arc of a round head, brazier head, or universal head rivet.
1791. The purpose of refrigerating 2017 and 2024 aluminum alloy rivets after heat treatment is
- to accelerate age hardening
  - to prevent work hardening
  - to relieve internal stresses
  - to retarded age hardening.\*
1792. Under certain conditions, type A rivets are not used because of their
- low strength characteristics \*
  - high alloy content
  - high stress per unit area
  - tendency toward embrittlement when subject to vibration.
1793. A rivet set used to drive AN470 or MS20470 rivets should
- have the same radius as the rivet head
  - have a slightly greater radius than the rivet head \*
  - be nearly flat on the end, with a slight radius on the edge to prevent damage to the sheet being riveted
  - have a slightly smaller radius than the rivet head.
1794. Most rivets used in aircraft construction have
- two raised bars on their heads
  - dimples \*
  - smooth heads without markings
  - a raised dot.
1795. Mild steel rivets are used for riveting
- nickel-steel parts
  - aluminum alloy parts
  - magnesium parts
  - steel parts.\*
1796. When riveting dissimilar metals together, certain precautions must be exercised in order to prevent an electrolytic action. The best procedure is
- treat the surfaces to be riveted together with a process called anodic treatment
  - place a thin gasket of aluminum tape, cellophane, or properly impregnated fabric between the two parts.\*
  - paint the two surfaces as well as the surrounding area with a dope-proof paint
  - avoid the use of dissimilar metals by redesigning the unit according to the recommendations outlined AC 43.13- 1A.
1797. The size drill used to remove a rivet is
- drill two sizes smaller than the rivet shank diameter
  - drill one size smaller than the rivet shank diameter\*
  - drill the same size as the rivet shank diameter
  - drill two sizes larger than the rivet shank diameter.
1798. Joggles in removed rivet shanks would indicate partial
- bearing failure
  - torsion failure
  - shear failure \*
  - tear failure.
1799. The type of load which causes the most rivet failures is
- Shear \*
  - Bearing
  - Head
  - Torsion.
1800. The rivet used for riveting nickel-steel alloys is
- 2017 aluminum
  - 2024 aluminum
  - Mild steel
  - Monel.\*
1801. If a streamline cover plate is to be hand formed using a form block, a piece of dead soft aluminum should first be placed over the hollow portion of the mold and security fastened in place. The bumping operation should be
- distributed evenly over the face of the aluminum at all times rather than being started at the edges or center
  - started by tapping the aluminum lightly around the edges and gradually working down into the center.\*
  - strated by tapping the aluminum in the center until it touches the bottom of the mold and then working out in all directions.
  - done alternately on the back and front of the metal to reduce internal stresses.

1802. A piece of flat stock that is to be bent to a closed angle of  $15^\circ$  must be bent through an angle of
- $165^\circ$  \*
  - $105^\circ$
  - $75^\circ$
  - $15^\circ$ .
1803. When a piece of aluminum alloy is to be bent using a minimum radius for the tape and thickness of material
- the piece should be bent slowly to eliminate cracking
  - the layout should be made so that the bend will be  $90^\circ$  to the grain of the sheet \*
  - less pressure than usual should be applied with the movable (upper) clamping bar
  - the movable (upper) clamping bar should be moved back from the bending leaf.
1804. If it is necessary to compute a bend allowance problem and bend allowance tables are not available, the neutral axis of the bend can be
- represented by the actual length of the required material for the bend
  - found by adding approximately one-half of the stock thickness to the bend radius \*
  - found by subtracting the stock thickness to the bend radius
  - that point at which the bent to a unbent sections of one leg meet.
1805. A piece of sheet metal is bent to a certain radius. The curvature of the bend is referred to as the
- bend line
  - bend allowance
  - neutral line
  - bend radius.\*
1806. Aluminum and aluminum alloy can be distinguished by
- filling the metal
  - testing with the vinegar
  - testing with a 10 percent solution of caustic soda.\*
  - grinding and watching the sparks.
1807. The purpose of a joggle is
- To allow clearance for a sheet or an extrusion \*
  - To form a chamfered reinforcing ridge.
  - To increase obstruction for a sheet or an extrusion
  - To decrease the weight of the part and still retain the necessary strength.
1808. On a sheet metal fitting layout with a single bend, allow for stretching by
- adding the setback to one side only
  - adding the setback to each leg
  - subtracting the setback from one leg
  - subtracting the setback from both legs.\*
1809. The aluminum alloys used in aircraft construction are usually hardened by which of the following methods ?
- Cold working
  - Aging
  - Heat treatment \*
  - Chemical.
1810. What is the advantage of annealing of aluminum ?
- It increases the tensile strength
  - It makes the material brittle
  - It removes stresses caused by forming \*
  - It makes the material hard.
- ### RIGGING
1811. The tail rotor of a helicopter could fail to compensate accurately for the torque of the main rotor if the
- power transmission is erratic
  - engine power is reduced
  - roor is inaccurately rigged \*
  - engine power is applied suddenly to the main rotor.
1812. The vertical flight of a helicopter is controlled by
- increasing or decreasing collective pitch \*
  - tilting the rotor disc
  - cyclic pitch changes
  - increasing or decreasing the RPM of the main rotor.
1813. A decrease in pitch angle of the tail rotor blades on helicopter
- causes the tail to pivot in the opposite direction of torque rotation around the main rotor axis
  - is produced by depressing the left antitorque pedal
  - causes the tail to pivot in direction of torque rotation around the main rotor axis \*
  - is required to counteract main rotor torque produced by take off RPM.
1814. How is tracking of helicopter rotor blades normally done ?
- On a special fixture before they are installed due to their flexibility
  - While the blades are rotating at a specified RPM and collective pitch angle \*
  - By triangulation while the blades are at rest and in a specified location in reference to the fuselage centerline
  - By direct measurement from the fuselage structure to specified blade station when the blade is parallel to the fuselage center line.
1815. A helicopter in forward flight, cruise configuration changes direction by
- varying the pitch of the main rotor blades
  - changing tail rotor RPM
  - tilting the main rotor disk in the desired direction\*
  - tilting the tail rotor.
1816. A hovering helicopter equipped with a tail rotor maintains directional control by
- changing the tail rotor RPM
  - tilting the main rotor disk in the desired direction
  - a conventional rudder and rudder control system
  - varying the pitch of the tail rotor blades.\*

1817. A single-rotor helicopter is in horizontal flight. The angle of attack of the advancing blade is
- more than the retreating blade
  - equal to the retreating blade
  - the same at any point around the rotor disk
  - less than the retreating blade.\*
1818. Main rotor blades that do not cone by the same amount during rotation, are said to be out of
- balance
  - lateral cyclic pitch
  - collective pitch
  - track.\*
1819. The torque force is associated with single-rotor helicopter compensated as :
- A tail rotor with a variable pitch mechanism that is actuated by pilot controls \*
  - A twist in the main rotor blade chord
  - A vertical flat plate that is acted upon by the main rotor down wash
  - a double set of planetary gears in the main transmission.
1820. The purpose of the free-wheeling unit in a helicopter drive system is :
- If disconnects the rotor whenever the engine stops or slows below the equivalent or rotor RPM \*
  - It releases the rotor brake for starting
  - It relieves bending stress on the rotor blades during starting
  - It allows the engine to be over-revived for landing.
1821. Lateral dihedral, a rigging consideration on most airplanes of conventional design, contributes most to stability of the airplane about its
- longitudinal axis \*
  - vertical axis
  - lateral axis
  - transverse axis.
1822. As the result of an accident, it is necessary to replace the fuselage fittings for the wing attachment. Prior to welding, the fittings in place, a great deal of care should be exercised in locating them in their proper position because the
- angle of attach will be re-established at this time
  - angle of incidence is one of the factors to be re-established at time \*
  - main spar attachment fittings must line up with fuselage fittings; otherwise, the spar location in the wing will have to be changed
  - aspect ratio of the wing will be controlled by the fuselage fittings.
1823. A pilot reported that an airplane flew left wing heavy. The condition is corrected by
- washing-in the right wing the washing-out the left wing, or both
  - washing-in the left wing, or washing-out the right wing, or both \*
  - washing-in the right wing only
  - washing-out the left wing only.
1824. If the vertical fin of a single-engine, propeller-driven airplane is rigged properly, it will generally be parallel to
- the longitudinal axis but not the vertical axis
  - the vertical axis but not the longitudinal axis \*
  - neither the longitudinal not the vertical axis
  - both the longitudinal and vertical axis.
1825. If an airplane has good longitudinal stability, it should have a minimum tendency to
- roll
  - pitch \*
  - yaw
  - stall.
1826. Airplanes of conventional design have a horizontal stabilizer located left of the wings and usually set at a different angle of incidence from the wing, this difference in angle is called
- the plane-form ratio
  - the angle of slagger
  - the angle of decalage
  - the longitudinal dihedral angle.\*
1827. If the angle of attack of an airfoil increases, the centre of pressure will
- move toward the trailing edge
  - remain stationary because both lift and drag components increase proportionally to increased angle of attack
  - remain stationary because of no change in the incidence angle
  - move toward the leading edge.\*
1828. The angle of incidence is that acute angle formed by
- the angular difference between the setting of the main airfoil and the auxiliary airfoil (horizontal stabilizer) in reference to the longitudinal axis of the aircraft
  - the angular difference between the wing settings of the two wings of a biplane
  - a line parallel to the wing chord and a line parallel to the longitudinal axis of the aircraft \*
  - a line parallel to the wing from root to tip and a line parallel to the lateral axis of the aircraft.
1829. An airplane's centre of lift usually located at its centre of gravity because
- the airplane will have a tail-heavy tendency
  - the airplane will have a nose-heavy tendency \*
  - it is impossible to predict the exact location of either, it is considered next best to having them both fall at the same point
  - stability about the longitudinal axis improves.
1830. An airplane is controlled directionally about its vertical axis by
- the rudder \*
  - the elevator(s)
  - the ailerons
  - a combination of two of the above.

1831. The elevators of a conventional airplane are used to provide rotation about the
- longitudinal axis
  - lateral axis \*
  - directional axis
  - vertical axis.
1832. Washing-in the left wing of a monoplane, for the purpose of rigging corrections after flight test, will have the effect on the lift and drag of that wing as:
- Both drag and lift will increase due to increased angle of attack
  - Both drag and lift will increase due to increase angle a attack \*
  - The lift will decrease due to the effect of the drag increase
  - The drag will decrease due to the effect of the lift increase.
1833. Flaps increase the effective lift (of an airfoil by
- increasing the camber of the airfoil \*
  - introducing drag aft of the center of pressure
  - reducing the profile drag
  - increasing the angle of attack of the airfoil.
1834. When the right wing of a monoplane is improperly rigged to a greater angle of incidence than designated in the manufacturer's specifications, it will result in
- the airplane to be off balance both laterally and directionally \*
  - the airplane to pitch and roll about the lateral axis
  - the airplane to be out or lateral balance only
  - the right wing to have both an increased lift and a decreased drag.
1835. The chord of a wing is measured from
- wingtip to wingtip
  - wing attachment point to the wingtip
  - leading edge to trailing edge \*
  - maximum upper camber to the base line.
1836. The physical factors which are involved in the aspect ratio of airplane wings are :
- Thickness and chord
  - Span and chord \*
  - Dihedral and angle to attack
  - Sweepback and lateral axis.
1837. An airplane that has a tendency to gradually increase a pitching moment that has been set into motion has
- poor longitudinal stability \*
  - good lateral stability
  - poor lateral stability
  - good longitudinal stability.
1838. Differential control on an aileron system implies that
- the down travel is more than the up travel
  - the up travel is more than the down travel \*
  - they travel up or down equally, but bell cranks are used
  - one aileron on one wing travels further up than the aileron on the opposite wing to adjust for wash-in and wash-out.
1839. Generally it is necessary to jack an aircraft indoors for weighing because
- aircraft my be placed in a level position
  - aircraft empty weight can be determined
  - the weighing scales are stabilized \*
  - None of these.
1840. Before jacking an aircraft, it is necessary to
- remove all optional equipment
  - install critical stress panels or plates \*
  - determine that the fuel tanks are empty
  - make sure the aircraft is leveled laterally.
1841. An aircraft can be operated with a 100-hour inspection overdue when
- it is necessary to reach a place at which the inspection can be done \*
  - the aircraft is operated under a continuous airworthiness program
  - when the aircraft is operated under a progressive inspection program
  - the aircraft is equipped with an hour meter.
1842. The maximum time a 100-hour inspection may be extended to
- 10 hr \*
  - 2 hr
  - 5 hr
  - 15 hr.
1843. Which statement is correct when an aircraft has not been approved for return to service after an annual inspection because of several items requiring minor repair?
- Only the person who performed the annual inspection may approve the aircraft for return to service
  - An appropriately rated mechanic may repair the defects and approve the aircraft for return to service \*
  - An appropriately rated mechanic may repair the defects, but an IA must approve the aircraft for return to service
  - An authorized repair station may repair the defects, but an appropriately rated mechanic must approve the aircraft for return to service.
1844. An aircraft that is due an annual inspection may be operated
- by a certificated pilot, but no passengers may be carried \*
  - if a special permit has been issued for the aircraft
  - for the purpose of performing maintenance
  - for a period of time not to exceed 10 hr.
1845. A 100-hour inspection of an aircraft is authorized to be conducted by :
- Any mechanic working for a repair station
  - Certificated mechanic with airframe and power plant ratings \*
  - Certificated repaiman
  - Certificated mechanic with power plant rating.



**AIRFRAME SYSTEM AND COMPONENTS**

1846. If the piston return spring broke in a brake master cylinder, the effect would be :
- The brakes would become spongy
  - The brake travel would become excessive
  - The brakes would drag \*
  - The brake linkage would seize.
1847. Spongy brakes are usually due to
- air in the system \*
  - both internal and external leakage
  - internal leakage
  - external leakage.
1848. A pilot reports that the right brake on an aircraft grabs when the brake pedal is depressed in a normal manner. The probable cause is that the right
- master cylinder piston rod is bent
  - wheel actuating cylinder is leaking fluid on the brake lining \*
  - master cylinder piston return spring is weak
  - brake drum contains considerable brake lining dust.
1849. Most aircraft tire manufacturers recommend that the tubes in newly installed tires be first inflated, fully deflated, and then reinflated to the correct pressure. Why ?
- To allow the tube to position itself correctly inside the tire \*
  - To eliminate all the air between the tube and the inside of the tire
  - To ensure that the wheel rim has been properly assembled
  - To test the entire assembly of leaks.
1850. The function of metering pins in (air/oil) shock struts serve is:
- To lock the struts in the up position
  - to lock the struts in the down position
  - To retard the flow of oil as the struts are compressed \*
  - To meter the proper amount of air in the struts.
1851. Tire and wheel manufacturers often recommend that the tires on split rim wheels be deflated before removing the wheel from the axle. Why ?
- To relieve the strain on the wheel retaining nut and axle threads
  - As a safety precaution in case the bolts that hold the wheel halves together have been damaged or weakened \*
  - So that the person removing the wheel will be sure to remember to jack the wheel
  - To remove the static load imposed upon the wheel bearings by the inflated tire.
1852. The braking action of single-disc brakes is accomplished by compressing a rotating brake disc between two opposite brake linings. Equal pressure on both sides of the rotating disc is assured by
- hydraulically interconnecting the brake linings located on opposite sides of the rotating disc
  - keeping the brake clearances closely adjusted
  - keying the disc loosely in the wheel so that it can move from side to side \*
  - letting the brake linings automatically equalize because of the greater rate of wear on the lining with the most pressure.
1853. It is determined that spongy brake action is not caused by air in the brake system. The next most likely cause is
- Worn brake lining
  - Internal leakage in the master cylinder
  - Deteriorated flexible hoses \*
  - Unevenly adjusted brakes.
1854. A stripe or mark extending from the rim of a wheel into the tire
- is a slippage mark \*
  - is a balance mark
  - indicates the tire is a high-pressure type
  - indicates the wheel is a high-speed type.
1855. All air has been purged from the brake system. This can be determined by
- operating a hydraulic unit and watching the system pressure gauge for smooth, fullscale deflection
  - the increased pedal movement for brake application
  - submerging the bleeder hose in hydraulic fluid and watching until all air bubbles have escaped \*
  - observing the reservoir sight gauge to determine if there is any fluid movement.
1856. Over-inflated aircraft tires may cause damage to the
- brake linings
  - wheel hub
  - brake drum
  - wheel flange.\*
1857. The function of deboosters used in brake systems is :
- To ensure rapid application and release of the brakes
  - To reduce brake pressure and maintain static pressure
  - To reduce the pressure and release the brakes rapidly \*
  - To increase pressure and release the brakes rapidly.
1858. If an out-of-tolerance condition of main landing gear wheels exists and it is determined not to be the result of bent or twisted components, it would be necessary to
- reposition the axle in the oleo trunnion
  - change the oleo assembly
  - insert, remove, or change location of washers or spacers at the center pivotal point of the scissor torque links \*
  - place shims or spacers behind the bearing or the out of tolerance wheel or wheels.

1859. To prevent rapid deterioration, aircraft tires should be stored in an area that is
- dry and warm
  - damp and cool
  - dry and cool \*
  - damp and warm.
1860. A raised H on the stem of an air valve core denotes that the valve core is a
- hydraulic type
  - hard-core type
  - high-pressure type \*
  - heavy-duty type.
1861. The primary purpose for balancing aircraft wheel assemblies is:
- To prevent heavy spots and reduce vibration \*
  - To distribute the aircraft weight property
  - To reduce excessive wear and turbulence
  - To improve the braking action.
1862. On all aircraft equipped with retractable landing gear, some means must be provided to
- retract and extend the landing gear if the normal operating mechanism fails
  - extend the landing gear if the normal operating mechanism fails \*
  - prevent extension of the landing gear at airspeeds greater than that determined structurally safe
  - prevent the throttle from being reduced below a safe power setting while the landing gear is retracted.
1863. The type of hydraulic fluid to be used in a shock strut depends upon the
- ambient temperature at the time of servicing
  - amount of air pressure in the shock strut
  - type of seals used in the shock strut \*
  - type of fluid in the landing gear actuating systems.
1864. An automatic damping action occurs at the steer damper if for any reason the flow of high-pressure fluid is removed from the
- outlet of the steer damper
  - inlet of the steer damper \*
  - replenishing check valve
  - tension steering valve.
1865. The purpose of a brake master cylinder is :
- To constantly maintain the correct volume of fluid in the hydraulic lines and brake components
  - To transform mechanical motion to hydraulic pressure
  - To provide a means for building up, varying, and releasing the hydraulic pressure required for brake operation
  - To perform all of the above functions.\*
1866. Aircraft brakes requiring a large volume of fluid to operate the brakes generally
- do not use brake pressure relief valves
  - use independent master cylinder systems
  - do not use brake system accumulators
  - use power brake control valves.\*
1867. The purpose of a sequence valve in a hydraulic retractable landing gear system is to ensure the operation at the proper time of the
- main gear safety switches
  - landing gear doors \*
  - nose gear safety switches
  - main gear downlocks.
1868. The pressure source for power brakes is
- the main hydraulic system \*
  - the power brake reservoir
  - a master cylinder
  - pressure being applied to the rudder pedals.
1869. The type of valve used in the brake actuating line to isolate the emergency brake system from the normal power brake control valve system is :
- A bypass valve
  - An orifice check valve
  - A brake pressure relief valve
  - A shuttle valve.\*
1870. When tightening the packing nut on an air/oil shock strut installed on an aircraft, the
- packing gland should be replaced
  - aircraft should be jacked \*
  - fluid should be removed from the strut
  - Torque should not exceed 800 ft. lb.
1871. The purpose of a relief valve in brake system is :
- To compensate for a drop in pressure
  - To reduce pressure for brake application
  - To prevent the tire from skidding
  - To compensate for thermal expansion.\*
1872. An aircraft equipped with multiple-disc brakes was reported to have sluggish and jerky brake operation. The action should taken is :
- Reduce the brake clearance
  - Disassemble and clean the automatic adjuster \*
  - Replace retractor springs
  - Bleed the brakes.
1873. If an aircraft shock strut (air/oil type) bottoms upon initial landing contact, but functions correctly during taxi, the most probable cause is
- low fluid \*
  - low air charge
  - a restricted material pin orifice
  - reversed metering pin.
1874. If an airplane equipped with master cylinders and single-disc brakes has excessive brake pedal travel, but the brakes are hard and effective, the probable cause is
- the master cylinder one-way cup is leaking
  - worn brake linings \*
  - the push rod between the brake pedal and the master cylinder is too long
  - worn brake disc causing excessive clearance between the notches on the perimeter of the disc and the splines or keys on the wheel.

1875. The correct inflation pressure for an aircraft tire can be obtained from
- tire pressure charts based on gross landing weight
  - the operator's manual \*
  - the information stamped on the wheel.
  - the aircraft's logbook.
1876. What should be checked when shock struts bottom during a landing ?
- Air pressure in the struts
  - Struts for correct alignment
  - Packing seals for binding
  - Fluid level.\*
1877. Failure of the landing gear to retract completely may be caused by
- a leaking accumulator air valve
  - the wrong grade of fluid
  - insufficient fluid in the system.\*
  - a leak in the return line.
1878. The left brake is dragging excessively on an airplane on which no recent brake service work has been performed. The most probable cause is
- foreign particles stuck in the master cylinder compensating port \*
  - excessively worn brake linings
  - too much play in the linkage interconnecting the pedals and the master cylinder
  - low fluid supply in the brake system reservoir.
1879. A tire has been subjected to a temperature high enough to melt one of the fusible plugs in the wheel. The tire should be
- be scrapped \*
  - removed from the wheel and inspected before returning it to service
  - recapped before returning it to service
  - returned to service if an external inspection reveals no carcass or tread damage.
1880. To avoid nylon tire spotting on an aircraft that is to remain idle for a period longer than 3 days the aircraft
- should be moved every 60 hr
  - should be moved every 36 hr
  - should be blocked up so that no weight is on the tires or moved every 48 hr \*
  - None of these.
1881. The best safeguards against heat buildup in aircraft tires are
- proper tire inflation, minimum braking, and fast taxi speeds
  - short ground rolls, slow taxi speeds, minimum braking and proper tire inflation \*
  - minimum braking, proper tire inflation, and long ground rolls
  - fast taxi speeds, short ground rolls, and coordinated turns.
1882. The fusible plugs installed in some aircraft wheels will
- facilitate servicing of the wheel assembly
  - indicate tire tread separation
  - eliminate the need to check air pressure
  - melt at a specified elevated temperature.\*
1883. Excessive wear in the shoulder area of an aircraft tire is an indication of
- over-inflation
  - excessive toe-in
  - under-inflation \*
  - fast cornering during taxi.
1884. Excessive wear in the center of the tread of an aircraft tire is an indication of
- under-inflation
  - excessive toe-out
  - excessive braking during landing roll and taxi
  - over-inflation.\*
1885. When an empty shock strut is filled, care should be taken to extend and compress the strut completely at least two times to
- thoroughly lubricate the piston rod
  - show if there are any fluid leaks
  - force out any excess fluid
  - ensure proper packing ring seating and removal of air bubbles.\*
1886. In shock struts, chevron seals are used to
- prevent air from escaping
  - absorb bottoming effect
  - prevent oil from escaping \*
  - serve as a bearing surface.
1887. On most aircraft, the old level of an air and oil shock strut is checked by
- removing the oil filler plug and inserting a gage
  - measuring the overall length of the strut
  - releasing the air and seeing that the oil is to the level of the filler plug \*
  - checking the air pressure.
1888. An electric motor used to raise and lower a landing gear is a
- shunt field series wound motor
  - split field shunt wound motor
  - continuous duty motor
  - split field series wound motor.\*
1889. When installing a chevron-type seal in an aircraft hydraulic cylinder, the open side of the seal should face
- opposite the direction of fluid pressure
  - up or forward when the unit is installed in a horizontal position
  - the direction of fluid pressure \*
  - down or aft when the unit is installed in a vertical position.

**HYDRAULIC SYSTEM**

1890. The device which in a hydraulic system with a constant delivery pump allows circulation of the fluid when no demands are on the system is :
- Pressure relief valve
  - Shuttle valve
  - Pressure regulator \*
  - Debooster valve.
1891. A fully-charged hydraulic accumulator provides
- air pressure to the various hydraulic components
  - a source for additional hydraulic power when heavy demands are placed on the system \*
  - positive fluid flow to the pump inlet
  - additional hydraulic fluid.
1892. The condition which would most likely cause excessive fluctuation of the pressure gauge when the hydraulic pump is operating is:
- Bourdon tube in the gauge is broken
  - accumulation air pressure low
  - Inadequate supply of fluid \*
  - System relief valve sticking closed.
1893. A filter incorporating specially treated cellulose paper is
- sediment trap
  - finger stainer
  - cuno filter
  - micronic filter.\*
1894. The purpose of an orifice check valve is:
- To relieve pressure to a sensitive component
  - To restrict flow in one direction \*
  - To relieve pressure in one direction and prevent flow in the other direction
  - To relieve pressure in locked mechanisms.
1895. To prevent external and internal leakage in aircraft hydraulic units, the most commonly used type of seal is the
- cup seal
  - O-ring seal \*
  - rubber seal
  - chevron seal.
1896. The component which allow free fluid flow in one direction and no fluid flow in the other direction is :
- Check valve \*
  - Selector valve
  - Metering piston
  - Master cylinder.
1897. The valve used in a hydraulic system that directs pressurized fluid to one end of an actuating cylinder and simultaneously directs return fluid to the reservoir form the other end is :
- Sequence
  - Shuttle
  - Check
  - Selector.\*
1898. The function of the absolute pressure regulator perform in the pneumatic power system is to regulate
- the compressor outlet air pressure to stabilize the system pressure
  - the pneumatic system pressure to protect the moisture separator form internal explosion
  - the compressor inlet air to prevent excessive speed variation and/or overspeeding of the compressor
  - the compressor inlet air to provide a stabilized source of air for the compressor.\*
1899. One of the distinguishing characteristics of an open center selector valve used in hydraulic system is that
- this type valve has only three ports
  - fluid flows through the valve in the OFF position\*
  - fluid flows in three directions in the ON position
  - a limited amount of fluid flows in the opposite direction.
1900. The type of packings which should be used in hydraulic components to be installed in a system containing Skydrol is :
- AN packings made of natural rubber
  - AN packings made of either natural rubber or neoprene
  - Packing materials made for ester-base fluids \*
  - AN packings made of neoprene.
1901. An aircraft pneumatic system which incorporates an engine-driven multi-stage reciprocating compressor, also requires
- an oil separator
  - surge chamber
  - a vacuum relief valve
  - a moisture separator.\*
1902. The removal of air form an aircraft hydraulic system generally presents no problem because
- the air will bleed out if the system is allowed to remain inoperative for a period of time \*
  - the air will be removed by operating the various hydraulic components through several cycles
  - the high working pressure in the system will physically unite the air and fluid which will result in the air being dissipated in the form of heat
  - each hydraulic actuator has a bleeder valve located on or adjacent to it for this purpose.
1903. Pneumatic systems employ
- hand pumps
  - relief valves \*
  - freon
  - diluter valves.
1904. The component in the hydraulic system that is used to direct the flow of fluid is the
- check valve
  - orifice check valve
  - relief valve
  - selector valve.\*
1905. The type of selector valve which is one of the most commonly used in hydraulic systems to provide for simultaneous flow of fluid into and out of a connected actuating unit is :
- Three-port, three-way valve
  - Four-port, closed center valve \*
  - Three-port, four-way valve
  - Two-port, open center valve.
1906. The purpose of using backup rings with O-rings in hydraulic systems above 1,500 PSI is :
- prevent internal and external leakage of all moving parts with a hydraulic system
  - provide a seal between two parts of a unit which move in relation to each other
  - prevent high pressure from extruding the seal between the moving and stationary part \*
  - prevent loss of fluid in the event of unit failure or line breakage.

1907. A flexible sealing element subject to motion is a  
 a. washer                                      b. compound  
 c. packing \*                                    d. gasket.
1908. An advantage of hydraulic systems is that they  
 a. requires maximum effort to inspect  
 b. complicate to install  
 c. maximum maintenance requirements  
 d. minimum maintenance requirements.\*
1909. The internal resistance of a fluid which tends to prevent it from flowing is called  
 a. volatility                                    b. flash point  
 c. viscosity \*                                    d. acidity.
1910. The viscosity of hydraulic fluid is defined as:  
 a. the increase in volume of a fluid due to temperature change  
 b. the temperature at which a fluid gives off vapour in insufficient quantity to ignite momentarily  
 c. the fluid's ability to resist oxidation and deterioration for long periods  
 d. the internal resistance of a fluid which tends to prevent it from flowing.\*
1911. The colour with which Petroleum base hydraulic fluid is dyed is:  
 a. Purple                                        b. Blue  
 c. Green                                         d. Red.\*
1912. The properties and characteristics of petroleum base hydraulic fluid are improved by  
 a. filters  
 b. lower operating temperatures  
 c. chemical analysis  
 d. additives.\*
1913. A characteristic of synthetic base hydraulic fluid is :  
 a. Low moisture retention  
 b. High viscosity  
 c. High flash point \*  
 d. Low flash point.
1914. Which of the following statements about fluids is correct ?  
 a. Any fluid will completely fill its container  
 b. All fluids are considered to be highly compressible  
 c. All fluids readily transmit pressure \*  
 d. Only liquids are considered to be fluids.
1915. What are three types of hydraulic fluids currently being used in civil aircraft ?  
 a. Mineral base, mixed mineral and vegetable base, and vegetable base  
 b. Mineral base, vegetable base, and phosphate ester base \*  
 c. Mineral base, phosphate ester base and mixed mineral and phosphate ester base  
 d. Mineral base, phosphate ester base, the alcohol base.
1916. The desirable properties of a good hydraulic fluid are:  
 a. High viscosity, low flash point, chemical stability, high fire point  
 b. High flash point, low viscosity, chemical stability, low fire point  
 c. Low flash point, low fire point, high viscosity, chemical stability  
 d. Low viscosity, chemical stability, high flash point, and high fire point.\*
1917. Characteristics of MIL-H-7544 hydraulic fluid are  
 a. red colour, petroleum base, will burn, synthetic rubber seals  
 b. light purple colour, phosphate ester base, fire resistant, butyl rubber seals  
 c. blue colour, vegetable base, will burn, natural rubber seals \*  
 d. blue colour phosphate ester base, fire resistant, butyl rubber seals.
1918. An aircraft's constant-pressure hydraulic system cycles more frequently than usual and no unusual fluid leakage can be detected. The most probable cause is  
 a. excessively high relief valve setting  
 b. moisture absorbed in the fluid  
 c. low accumulator air preload \*  
 d. an obstruction in the reservoir vent line.
1919. The valve installed in a hydraulic system which will have the highest pressure setting is :  
 a. Pressure regulator valve  
 b. Main relief valve  
 c. Thermal relief valve \*  
 d. Pump unloading valve
1920. If two actuating cylinders which have the same cross-sectional area but different lengths of stroke are connected to the same source of hydraulic pressure, they will exert  
 a. different amounts of force but will move at the same rate of speed  
 b. equal amounts of force but will move at different rates of speed  
 c. equal amounts of force and will move at the same rate of speed \*  
 d. different amounts of force and will move at different rates of speed.
1921. The purpose of a hydraulic pressure regulator is  
 a. to prevent the system pressure from rising above a predetermined amount due to thermal expansion  
 b. to direct the entire pump output to the essential units in case of emergency  
 c. to boost the pressure in the portions of the system that require higher pressure  
 d. to relieve the pump of its load when no actuating units are being operated.\*

1922. Severe kickback of the emergency hydraulic hand pump handle during the normal intake stroke will indicate :
- the hand pump inport check valve is sticking open
  - the main system relief valve is set too high
  - the accumulator still contains its normal air charge and the emergency hand pump cannot override it
  - the hand pump outport check valve is sticking open.\*
1923. Before removing the filler cap of a pressurized hydraulic reservoir
- relieve the hydraulic system pressure
  - actuate several components in the system
  - relieve the air pressure \*
  - disconnect all electrical power.
1924. The primary function of the hydraulic system accumulator is:
- To act as an emergency supply of fluid for the hand pump
  - to ensure a continuous supply of fluid to the engine driven pump
  - to relieve the pump of the constant load when no units in the system are operating
  - to supplement the pump when it is under peak load.\*
1925. Chattering of the hydraulic pump during engine runup is an indication that
- the pressure gauge snubber is inoperative
  - the main system relief value is sticking open
  - the ball-check valve has not been installed at the pump outlet
  - there is an air leak in the pump inlet line.\*
1926. A hydraulic motor converts fluid pressure to
- linear motion
  - rotary motion \*
  - angular motion
  - vertical motion.
1927. The main purpose of a pressurized reservoir in a hydraulic system is to prevent
- tank collapse
  - hydraulic pump cavitation \*
  - hydraulic fluid from foaming
  - normal accumulator pressure from saving.
1928. An emergency supply of fluid is often retained in the main hydraulic system reservoir by the use of a standpipe located in the
- reservoir filler neck extension
  - inlet from the main hydraulic system
  - outlet to the emergency pump
  - outlet to the main system pump \*
1929. The phosphate ester base hydraulic fluid is removed from aircraft tires by washing with
- soap and water \*
  - petroleum solvent
  - acetone
  - alcohol.
1930. The material used to remove petroleum base hydraulic fluid from aircraft tires is :
- Acetone
  - Soap and water \*
  - Petroleum solvent
  - Alcohol.
1931. Hydraulic system thermal relief valves are set to open at
- a lower pressure than the system relief valve
  - a higher pressure than the system relief valve \*
  - a lower pressure than the system pressure regulator
  - the same pressure required to open the system relief valve.
1932. Chatter in a hydraulic system is caused by
- excessive system pressure
  - insufficient system pressure
  - air in the system \*
  - improper adjustment of the pressure regulator.
1933. If the hydraulic system pressure is normal while the engine-driven pump is running, but there is no pressure after the engine has been shut off, it indicates
- the system relief valve setting is too high
  - no air pressure in the accumulator \*
  - the pressure regulator is too high
  - the pressure of air in the system.
1934. The section of a turbojet engine which provides air for the pressurization and air-conditioning systems of a jet aircraft is :
- Exhaust
  - Compressor \*
  - Combustion
  - Intake.

### COOLINGSYSTEMS

1935. The component of an air-cycle cooling system, which undergoes a pressure and temperature drop of air during operation is :
- Water separator
  - Expansion turbine \*
  - Primary heat exchanger
  - Refrigeration bypass valve.
1936. In a freon vapour-cycle cooling system, coolant air for the condenser is obtained from
- turbine engine compressor
  - ambient air \*
  - subcooler air
  - pressurized cabin air.
1937. Ventilating air is used on a combustion heater because it
- provides combustion air for ground blower
  - carries heat to the places where needed \*
  - keeps overheat thermoswitch cool
  - provides oxygen required to support the flame.
1938. Turbine engine air used for air-conditioning and pressurisation is generally called
- compressed air
  - ram air
  - conditioned air
  - bleed air.\*

1939. When the cabin pressure regulator is operating in the differential mode, reference pressure is vented to the atmosphere by the
- dump valve
  - relief valve
  - isobaric metering valve
  - differential metering valve.\*
1940. In the combustion air system, what prevents too much air from entering the heaters as air pressure increases?
- Either a combustion air relief valve or a differential pressure regulator \*
  - Only a differential pressure regulator can be used
  - Only a combustion air relief valve can be used
  - Both a combustion air relief valve and a differential pressure regulator in every system.
1941. When the cabin pressure regulator is operating in the isobaric range, cabin pressure is maintained constant by
- the movement of the regulator bellows
  - limiting the flow of air to the cockpit
  - the action of the cabin pressure safety valve
  - limiting the air form the reference chamber.\*
1942. The parameter which controls the operation of the cabin pressure regulator is :
- Cabin air pressure \*
  - Ram air pressure
  - Bleed air pressure
  - Compression air pressure.
1943. The basic air-cycle cooling system consists of
- a source of compressed air, heat exchangers, and a turbine \*
  - heaters, coolers and compressors
  - ram air source, compressors, and engine bleeds
  - heat exchangers and evaporators.
1944. The purpose of the dump valve in a pressurized aircraft is to relieve
- all positive pressure from the cabin \*
  - a negative pressure differential
  - the load on the compressors
  - pressure in excess of the maximum differential.
1945. The component in a vapour cycle air-cooling system which would most likely be at fault if a system would not take a freon charge is:
- Evaporator
  - Expansion valve \*
  - Condenser
  - Receiver-dryer.
1946. Frost or ice buildup on a vapour-cycle, air-cooling system evaporator would most likely be caused by
- too much freon in the system
  - moisture in the evaporator
  - inadequate airflow through the evaporator \*
  - high humidity.
1947. The test used to determine the serviceability of an oxygen cylinder is:
- Pressure test with high pressure nitrogen
  - Pressure test with compressed air
  - Pressure test with oxygen
  - Pressure test with water.\*
1948. The type of oxygen system which uses the rebreather bag principle is :
- Pressure demand
  - Diluter demand
  - Continuous flow \*
  - Demand.
1949. The cabin pressure of a pressurized aircraft is usually controlled by
- a valve that stops the pressurisation pump when a pressure equivalent to the maximum safe cabin altitude has been reached
  - a pressure-sensitive switch that causes the pressurisation pump to turn on or off as required
  - an automatic outflow valve that dumps all the pressure in excess of the amount for which it is set.\*
  - by a pressure-sensitive valve that controls the output pressure of the pressurisation pump.
1950. A good practice concerning the inspection of heating and exhaust systems of aircraft utilizing a jacket around the engine exhaust as a heat source is:
- all exhaust and heating system components should be replaced at each engine overhaul period
  - supplement physical inspections with periodic operational carbon monoxide detection tests \*
  - all exhaust system components should be removed periodically, and their condition determined by the magnetic-particle inspection method
  - all exhaust system components should be removed and replaced at each 100-hour inspection period.
1951. What will result if auxiliary (ambient) ventilation is selected during pressurized flight while at cruising altitude?
- An increase in cabin pressure
  - Cabin compressor overspeed
  - Increased cabin altitude \*
  - Increased conditioned air efficiency.
1952. The cabin pressure control setting has a direct influence upon the
- outflow valve opening \*
  - cabin supercharger compression ratio
  - pneumatic system pressure
  - turbo compressor speed.
1953. The function of the evaporator in a freon cooling system is :
- To liquefy freon in the line between the compressor and the condenser
  - To lower the temperature of the cabin air \*
  - To transfer heat from the freon gas to ambient air
  - To evaporate water and other impurities freon .

1954. The purpose of a mixing valve in an air-conditioning system is:
- to dehumidify cabin air by mixing it with dry air
  - to control the supply of hot, cool, and cold air \*
  - to distribute conditioned air evenly to all parts of the cabin
  - to combine emergency ram air with conditioned air.
1955. The component of a pressurisation system which prevents the cabin altitude from becoming higher than airplane altitude is:
- cabin rate of descent control
  - negative pressure relief valve \*
  - supercharge overspeed valve
  - compression ratio limit switch.
1956. If the cabin rate of climb is too great, the controls should be adjusted to cause the
- outflow valve to close slower
  - cabin compressor speed to increase
  - outflow valve to close faster \*
  - cabin compressor speed to decrease.
1957. The position of the thermostatic expansion valve in a vapour-cycle cooling system is determined by temperature and pressure of
- the freon entering the evaporator
  - the air in the outlet of the condenser
  - the air in outlet of the thermostatic expansion valve
  - the freon in the outlet of the evaporator.\*
1958. A loss of pressurization through a disengaged cabin air compressor is prevented by
- Firewall shutoff valve
  - supercharger disconnect mechanism
  - cabin pressure outflow valve
  - delivery air duct check valve.\*
1959. When servicing an air-conditioning system that has lost all of its freon charge, it is necessary to
- evacuate the system, purge it of air and moisture, evacuate it again, and add the oil and freon
  - evacuate the system, purge it of air and moisture, and add oil and freon \*
  - purge the system, purge it of air and moisture, and add oil and freon
  - add oil and freon only, since attempting to evacuate or purge the system will add to the danger of contamination.
1960. The function of the pressurization system outflow valve is to provide for
- air outflow only \*
  - air outflow, pressure relief, and cabin pressure warning
  - manual dumping of cabin pressure
  - air outflow, pressure relief, and vacuum relief.
1961. One purpose of a jet pump in pressurisation and air-conditioning system is :
- to produce a high pressure for operation of the outflow valve
  - to circulate fluids through the fluids through the freon system
  - to control the speed of the engine-driven cabin compressor
  - to control the volume of the exhaust air in the radio rack cooling duct.\*
1962. The operation of an aircraft combustion heater is usually controlled by a thermostat circuit which
- alternately turns the fuel on and off, a process known as cycling \*
  - measures the amount of fuel continuously entering the heater and therefore regulates the heater's BTU output
  - regulates the voltage applied to the heater's ignition transformer
  - operates a duct damper and therefore allows only the required part of the heater's output to circulate in the cabin ducts; the remainder is dumped overboard.
1963. The air-cycle cooling system produces cold air by
- routing conditioned air through the cooling fan
  - passing heated air through a compressor
  - passing air through cooling coils that contain a refrigerant
  - extracting heat energy across an expansion turbine.\*.
1964. Maximum taper contact between crankshaft and propeller hub is determined by using
- a telescoping gauge
  - bearing blue colour transfer \*
  - a micrometer
  - a surface gauge.
1965. An airplane is cruising at 8,000 ft., and the cabin altitude is stabilized at 3,000 ft. using manual controls after failure of the automatic controls. If the airplane climbs 500ft. and the manual control setting is not changed, the cabin altitude will
- remain at 3,000 ft.
  - climb to 7,500 ft.
  - descend to 2,500 ft.
  - climb to 3,500 ft.\*
1966. When checking a freon system, a steady stream of bubbles in the sight gauge indicates
- here is a little too much charge
  - the charge is extremely high
  - the proper amount of air is in the system
  - the charge is low.\*
1967. Which of the following articles of safety gear must be worn when working with Freon 12 ?
- particle mask
  - Ear plugs
  - rubber-soled safety shoes
  - goggles.\*



1968. An aircraft fuselage is subjected to five major stresses. Pressurisation would be classified as a  
 a. tension stress \*      b. compression stress  
 c. torsion stress      d. shear stress.
1969. The purpose of evacuating freon air-conditioner system is to  
 a. check for leaks  
 b. remove all stale worn-out liquid  
 c. assure that all check valves are sealed  
 d. remove moisture.\*
1970. The operating cabin pressurization ranges of a pressurized aircraft are  
 a. isobaric, differential, and maximum differential  
 b. differential, unpressurised, and isobaric \*  
 c. ambient, unpressurised, and isobaric  
 d. unpressurised, differential, an ambient.
1971. A pressurisation controller uses which of the following?  
 a. bleed air pressure, outside air temperature, and cabin rate of climb  
 b. barometric pressure, cabin altitude, and cabin rate of change \*  
 c. cabin rate of climb, bleed air volume, and cabin pressure  
 d. outside air temperature, cabin rate of climb, and cabin pressure.
1972. What is the condition of the refrigerant as it enters the condenser of a vapour-cycle air-cooling system ?  
 a. High-pressure liquid      b. Low-pressure liquid  
 c. High-pressure vapour \*      d. Low-pressure vapour.
1973. What unit in a vapour-cycle air-cooling system serves as a reservoir for the refrigerant ?  
 a. Receiver-dryer \*      b. Evaporator  
 c. Compressor      d. Condenser.
1974. What is the condition of the refrigerant as it enters the evaporator of a vapour-cycle air-cooling system ?  
 a. High-pressure liquid  
 b. Low pressure vapour  
 c. Low-pressure liquid \*  
 d. High-pressure vapour.
1975. What drives the air-conditioning compressor on most small aircraft?  
 a. An electric motor  
 b. Ram air  
 c. The aircraft engine through a belt drive \*  
 d. A hydraulic motor.
1976. What is the condition of the refrigerant as it leaves the condenser of a vapour-cycle air-cooling system ?  
 a. High-pressure liquid  
 b. Low-pressure liquid  
 c. Low-pressure vapour \*  
 d. High-pressure vapour.
1977. What is the condition of the refrigerant as it leaves the evaporator condenser of a vapour-cycle air-cooling system ?  
 a. Low-pressure liquid  
 b. High-pressure liquid \*  
 c. High-pressure vapour  
 d. Low-pressure vapour.
1978. When purging a freon air-conditioning system it is important to release the charge at a slow rate. What is the reason or the slow-rate discharge ?  
 a. prevent the large amount of freon from contaminating the surrounding atmosphere  
 b. Prevent excessive loss of refrigerant oil \*  
 c. Prevent excessive chattering of the expansion valve  
 d. prevent condensation from forming and contaminating the system.
1979. What is used in some oxygen systems to change high cylinder pressure to low system pressure ?  
 a. Pressure reducer valve \*  
 b. Pressure relief valve  
 c. Calibrated fixed orifice  
 d. Diluter-demand regulator.
1980. If the pressure reducer fails, what prevents high-pressure oxygen from entering the system down stream?  
 a. Check valve  
 b. Cylinder control valve  
 c. Pressure relief valve \*  
 d. Manifold control valve.
1981. Oxygen systems in unpressurised aircraft are generally of  
 a. the continuous-flow and pressure-demand types\*  
 b. the continuous-flow type only  
 c. the pressure-demand type only  
 d. the portable-bottle type only.
1982. A contaminated oxygen system is normally purged with  
 a. castile soap and water  
 b. oxygen \*  
 c. compressed air  
 d. nitrogen.
1983. How do you determine the amount of oxygen in portable, high-pressure cylinder ?  
 a. weigh the cylinder and its contents  
 b. read the pressure gauge mounted on the cylinder\*  
 c. measure the pressure at the mask  
 d. check the flow indicator during use.

## FUELSYSTEM

1984. The maximum takeoff weight for a transport category aircraft is 105% of the maximum landing weight. The system required is :  
 a. Fuel jettison \*      b. Fuel injection  
 c. Crossfeed by pass      d. Fuel transfer.

1985. How is fuel jettisoning usually accomplished ?
- through a common manifold and outlet in each wing \*
  - by gravity flow into the outboard wing tanks and over board through a common outlet in each wing
  - by pump pressure into the crossfeed manifold and overboard thorough the vent lines
  - through individual outlets for each tank.
1986. One of the requirements of fuel jettisoning systems is:
- the system and its operation must be free from fire hazards \*
  - the time required to jettison fuel must not exceed 10 minutes
  - the fuel must be discharged form outlets at the tail of the aircraft
  - the fuel must be discharged from outlets at the wing tips.
1987. A fuel jettisoning system comprises
- filters, switched, valves, dump chute, and chute operating mechanisms
  - lines, valves, dump chutes, and chute operating mechanisms \*
  - tanks, filters, valves, lines, dump chutes, and chute operating mechanisms
  - flowmeters, filters, valves, lines, dump chutes, and chute operating mechanisms.
1988. The system employed to maintain lateral stability when jettisoning fuel is :
- two separate independent systems \*
  - crossfeed system
  - two interconnected systems
  - equalizer system.
1989. A fuel jettison system is required if the maximum take off weight exceeds the maximum landing weight on
- transport category aircraft only
  - aircraft that weight over 12,500 lb. only \*
  - both transport category and general aviation aircraft
  - general aviation aircraft only.
1990. The procedure which must be followed when defueling aircraft with sweptback wings is :
- defuel all the tanks at one time
  - defuel the fuselage tanks last
  - defuel the inboard wing tanks first
  - defuel the outboard wing tanks first.\*
1991. Oil leakage around the rear cone of a hydromatic propeller usually indicates a defective
- piston gasket
  - blade-barrel packing
  - spider-shaft oil seal \*
  - dome-barrel oil seal.
1992. The crossfeed systems are used in multi-engine aircraft fuel systems :
- to permit dumping of excess fuel
  - to reduce number of fuel lines
  - to maintain a balanced fuel conditions \*
  - to reduce refueling time.
1993. The purpose of the crossfeed system is :
- to allow the feeding of any engine form any tank \*
  - to allow removal of residual fuel
  - to allow the feeding of fuel form tank for defueling
  - to provide automatic refueling of a tank to any desired level.
1994. Fuel system components must be bonded and grounded so as to
- drain off static charges \*
  - prevent stray currents
  - identify the components
  - stabilize the units.
1995. One precaution that must be observed during fueling operations is :
- all outside electrical sources must be disconnected form the aircraft
  - fuel to be used must be appropriately identified \*
  - all electrical switches must be in OFF position
  - Fuel must be filtered through a chamois.
1996. Before fueling an aircraft by using the pressure fueling method, an important precaution that should be observed is :
- the truck pump pressure must be correct for that refueling system \*
  - the truck pump pressure must be adjusted for minimum filter pressure
  - the hose must be connected before grounding
  - the aircraft's electrical system must be on to indicate quantity gauge reading gauge readings.
1997. The flight safety related advantage of a pressure fueling system is that it
- eliminates aircraft skin damage
  - increase he chances of static electricity ligniting fuel vapours
  - reduces the chances for fuel contamination \*
  - reduces the time required for fueling.
1998. Aircraft pressure fueling systems instructional procedures are normally placarded on the
- flightcrew checklist
  - fuel control panel access door \*
  - lower wing surface adjacent to the access door
  - ground crew checklist.
1999. The pressure fueling method is more practical for large aircraft than the over-the-wing method because
- it reduces training time or fuel servicing personnel
  - it saves time by providing single point to fuel the entire aircraft \*
  - it saves fuel by reducing the chances for over-fills
  - it reduces the possibility of structural damage to bladder-type fuel cells.
2000. Most integral fuel tanks are repaired by:
- welding
  - brazing
  - soldering
  - riveting.\*

2001. The recommended practice for cleaning a fuel tank before welding is :
- immerse in a 5-percent solution of nitric acid
  - purge the tank with air
  - wash inside of tank with clean water
  - clean the tank interior with steam.\*
2002. An aircraft's integral fuel tank is
- removable from the aircraft
  - usually located in the bottom of the fuselage
  - a part of the aircraft structure \*
  - a self-sealing tank.
2003. The gas used for purging an aircraft fuel tank is :
- Hydrogen
  - Carbon Dioxide \*
  - Oxygen
  - Carbon monoxide.
2004. The main fuel stainer located at the lowest point in the fuel system because
- it eliminates the need for fuel tank sumps
  - it traps any small amount of water that may be present in the fuel system \*
  - it provides a drain for residual fuel
  - it filters and traps all micro-organisms that may be present in the fuel system.
2005. Entrained water in aviation turbine fuel is a hazard because of its susceptibility to freezing as it passes through the filters. A common method of preventing this hazard is :
- deicing fluid in the fuel
  - micromesh fuel strainers
  - high-velocity fuel pumps
  - anti-icing fuel additives.\*
2006. One of the first items to be checked when troubleshooting a rough running fuel-injected engine is:
- Excessive fuel pressure
  - Inadequate fuel flow
  - Clogged air screen
  - Clogged fuel nozzles.\*
2007. The presence of fuel stains around a fuel nozzle indicates :
- too much fuel pressure
  - excessive airflow across the venturi
  - clogged fuel nozzle \*
  - loose manifold.
2008. The method which would be used to check for internal leakage of a fuel valve without removing the valve from the aircraft is
- place the valve in the OFF position, drain the stainer bowl, and with boost pump on, watch to see if fuel flows to the stainer bowl \*
  - remove fuel cap(s), turn boost pump(s) on and watch for bubbling in the tanks
  - disconnect valve inlet line and observe for fuel leakage
  - apply regulated air pressure on the downstream side of the fuel pump and listen for air passing through the valve.
2009. Jet fuels are more susceptible to water contamination than aviation gasoline because
- Jet fuel has a higher viscosity than gasoline \*
  - Condensation is greater because of the rapid burn-off of jet fuels
  - Jet fuel is lighter than gasoline, therefore water is more easily suspended
  - Processing and handling of jet fuel is less stringent than gasoline.
2010. When installing a rigid fuel line, 1/2-inch in diameter, at what intervals should the line be supported ?
- 24-inches
  - 36-inches
  - 12-inches \*
  - 16-inches.
2011. Some aircrafts are protected against airframe icing by heating the leading edges of the airfoils and intake ducts. This type of anti-ice system usually operated during flight is :
- continuously while the aircraft is in flight
  - in symmetric cycles during icing conditions to remove ice as it accumulates
  - at all times while the outside air temperature is below freezing
  - whenever icing conditions are first encountered to expected to occur.\*
2012. The purpose of the oil separator in the pneumatic deicing system is :
- to protect the deicer boots from oil deterioration \*
  - to remove oil from air exhausted from the deicer boots
  - to prevent an accumulation of oil in the vacuum system
  - to remove oil from the vacuum pump.
2013. The heat sensors are located on most aircraft with electrically heated windshields as :
- Imbedded in the glass \*
  - Attached to the glass
  - Around the glass
  - Attached to the frame.
2014. What are three possible sources of hot air for the operation of a wing thermal anti-icing systems ?
- Turbo-compressors, air storage tank, vacuum pump
  - Engine bleed air, vacuum pump, compressed air tank
  - Engine bleed air, combustion heaters, augmentor tubes \*
  - Combustion heaters, augmentor tubes, exhaust gases.
2015. What does breakdown of arcing in an electrically heated windshield panel usually indicate ?
- temperature sensing elements
  - autotransformers
  - conductive coating \*
  - thermal overheat switches.

2016. Carburetor icing may be eliminated by :
- Alcohol spray and heated induction air \*
  - Alcohol spray and heating induction duct
  - Ethylene glycol spray and heated induction air
  - Electrically heating air intake and ethyleneglycol spray.
2017. The mixture that may be used as a deicing fluid to remove frost from an aircraft surface is :
- Ethylene glycol and isopropyl alcohol \*
  - Mild soap and water
  - Methyl ethyl ketone and ethylene glycol
  - Naphtha and isopropyl alcohol.
2018. Wet snow deposits from an aircraft are removed by :
- a brush or a squeegee \*
  - hot air
  - warm water
  - a chamois or a mop.
2019. Ice formation on a pitot tube is prevented by :
- an electric heating element built into the pitot head\*
  - a ribbon heater installed around the pitot head
  - a blanket-type heater installed on the pitot head
  - a gasket heater installed at the base of the pitot head.
2020. The icing condition which may occur in warm weather when there is no visible moisture present is :
- Glaze ice
  - Rime ice
  - Carburetor ice \*
  - Wing leading edge ice.
2021. The ice in a turbine engine, if the compressor is immobile because of ice, can be melted by
- Deicing fluid
  - Hot water
  - Anti-icing fluid
  - Hot air.\*
- FIRE DETECTION**
2022. The temperature sensing element used in an electrically heated windshield is :
- Resistor
  - Thermistor \*
  - Capacitor
  - Condenser.
2023. The area of an aircraft which carbon monoxide detector is loaded is :
- Surface combustion heater compartment
  - Cockpit and/or cabin \*
  - Auxiliary power unit compartment
  - Engine and/or nacelle.
2024. When a visual smoke detector is activated
- a warning bell within the indicator alarms automatically
  - a lamp within the indicator illuminates automatically.\*
  - a lamp within the indicator extinguishes automatically
  - the test lamp illuminates and an alarm is provided automatically.
2025. The three types of fire extinguishing agents for aircraft interior fires are
- water, methyl bromide, and carbon dioxide
  - water, dry chemical, and methyl bromide
  - water, carbon dioxide, and dry chemical \*
  - water, dry chemical, and chlorobromomethane.
2026. When air samples contain carbon monoxide, portable carbon monoxide detectors containing yellow silica gel will turn
- blue
  - green \*
  - pink
  - red.
2027. Smoke detectors which use a measurement of light transmissibility in the air are known as
- electromechanical devices
  - photoelectrical devices \*
  - visual devices
  - electromeasuring devices.
2028. A contaminated carbon monoxide portable test unit would be returned to service by
- heating the indicating element to 300°F to reactivate the chemical
  - installing a new indicating element \*
  - evacuating the indicating element with conductor
  - taking no action, unit is self-reactivating.
2029. The fire-detection system which measures temperature rise compared to a reference temperature is called :
- Fenwal continuous loop
  - Thermal switch
  - Lindberg continuous element
  - Thermocouple.\*
2030. A carbon dioxide hand-held fire extinguisher may be used on an electrical fire if
- the siphon tube is rigid
  - the horn is nonmetallic \*
  - the handle is insulated
  - the horn is nonmagnetic.
2031. The proper fire-extinguishing agent to use on an aircraft brake fire is
- carbon tetrachloride
  - dry chemical \*
  - water
  - carbon dioxide.
2032. The most desirable agent for use in hand-type fire extinguishers installed in aircraft is:
- water
  - Carbon dioxide \*
  - Carbon tetrachloride
  - Bromotrifluoromethane.

2033. Which of the following statements is correct concerning the operation of a photoelectric smoke detector ?
- a photoelectric smoke detector measures the amount of smoke under a specific set of conditions
  - a photoelectric smoke detector measured the amount of light available under a specific set of conditions
  - a photoelectric smoke detector will warn only when smoke is present \*
  - a photoelectric smoke detector is not affected by dust, soot, or other contaminants because it senses the difference between these and smoke .
2034. The thermocouple fire-warning system is activated by
- slowly overheated engine
  - certain temperature
  - more resistance drop
  - rate or temperature rise \*
2035. Built-in-aircraft fire-extinguishing systems are ordinarily charged with
- carbon monoxide and nitrogen
  - freon and nitrogen \*
  - carbon tetrachloride
  - sodium bicarbonate.
2036. The type of fire-detection system would also signal an overheat condition is:
- Thermocouple system
  - Continuous loop system
  - Pressure-sensitive responder system \*
  - thermograph system.
2037. On a periodic check of fire-extinguisher containers, the pressure was not between minimum and maximum limits. The procedure should be followed is :
- Release pressure if it is above limits
  - Replace the extinguisher container \*
  - Increase pressure if it is below limits
  - Leave it alone, as pressure will change with temperature change.
2038. The fire-extinguishing agent which is the safest to use from the point of toxicity and corrosion hazards is
- Carbon dioxide \*
  - Methyl bromide
  - Chlorobromethane
  - All of these.
2039. In aircraft using gas turbines, the cycle used is :
- Simple \*
  - Regenerating
  - Reheating
  - Reheating with regeneration.

## AVIATION POWER PLANTS

2040. The type of bearings used in highpowered reciprocating aircraft engines is :
- There is less rolling friction when ball bearings are used that when roller bearings are employed \*
  - Crankshaft bearings are generally of the ball-type due to their ability to withstand extreme loads without overheating
  - Crankshaft bearings are generally of the ball-type due to their ability to withstand loads. However, some manufacturers object to their use because this type of bearing requires a positive high-pressure oil supply.
  - None of these.
2041. The propeller reduction gear ratio which will cause the highest propeller RPM (assume the same engine RPM in each case) is
- 16:7
  - 16:9
  - 20:9 \*
  - 3:2.
2042. Which of the following indication would be the least likely to be caused by failing engine bearing ?
- Excessive oil consumption
  - High oil temperature
  - Low oil temperatures \*
  - Low oil pressure.
2043. The principle advantage of using propeller reduction gears is :
- The propeller RPM can be increased without an accompanying increase in engine RPM
  - The diameter and blade area of the propeller cab be increased
  - The engine RPM can be increased with an accompanying increase in power which allows the propeller to remain at a lower, more efficient RPM\*
  - The engine RPM can be increased with an accompanying increase in propeller RPM.
2044. The thrust bearing used in most radial engines is of the type :
- Tapered roller
  - Double-row ball
  - Double-row straight roller
  - Deep-groove ball.\*
2045. Which of the following bearings is leas likely to be a roller or ball bearing ?
- Rocker-arm bearing (overhead valve engine)
  - Master rod bearing (radial engine) \*
  - Crankshaft main bearing (radial engine)
  - Generator armature bearing.
2046. The horsepower developed in the cylinders of a reciprocating engine is called
- shaft horsepower
  - indicated horsepower \*
  - brake horsepower
  - thrust horsepower.

2047. The events occurring in a four-stroke cycle engine in the order of their occurrence are
- intake, ignition, compression, power, exhaust
  - intake, power, compression, ignition exhaust
  - intake, compression, ignition, power, exhaust \*
  - intake, ignition, power, compression, exhaust.
2048. If fuel/air ratio is proper and ignition timing is correct, the combustion process should be completed
- 20° to 30° before top centre at the end of the compression stroke
  - when the exhaust valve opens at the end of the power stroke
  - just after top centre at the beginning of the power stroke \*
  - none of these.
2049. In how many ways the clearance between the rocker arm and the valve tip affects ?
- point at which valve opens
  - height of the valve opening
  - duration of the valve opening
  - all of these.\*
2050. The strokes on which both valves on a four-stroke cycle reciprocating engine cylinder open are
- exhaust
  - Intake
  - Power and intake
  - Exhaust and intake.\*
2051. While performing timing a magneto to an engine using a d.c. continuity tester, the primary circuit between the coil and the breaker points should be opened to prevent the
- points from welding together
  - primary coil from burning out if the timing operation is prolonged
  - permanent magnet from becoming neutralized \*
  - condenser action from interfering with the timing operation.
2052. The function of cam-round pistons are installed in some aircraft engines is :
- to provide a better fit at operating temperatures \*
  - to cause the master rod piston to wear at the same rate as those installed on the articulating rods
  - to act as a compensating feature so that a compensated magneto is not required
  - to equalise the wear on pistons that do not operate in a vertical plane.
2053. An overhead valve engine using zero-lash hydraulic valve lifters is observed to have no clearance in its valve operating mechanism after the minimum inlet oil and cylinder head temperature for takeoff have been reached. This happens
- during normal operation \*
  - when the lifters become deflected
  - when carbon and sludge becoming trapped in the lifter and restricting its motion
  - when inverting the tappet valve during assembly of the lifter.
2054. The crank shaft rotation in degrees is measured by :
- Dial indicator
  - Top-center indicator
  - Timing disk \*
  - Timing light
2055. An engine with a stroke of 6 inches is operated at 2,000 RPM. The piston movement within the cylinder will be
- at maximum velocity around T.D.C
  - constant during the entire 360° of crankshaft travel
  - at maximum velocity 90° after T.D.C \*
  - average approximately 60 MPH.
2056. Which statement is correct regarding a four stroke cycle aircraft engine ?
- The intake valve closes on the compression stroke\*
  - The exhaust valve opens on the exhaust stroke
  - The intake valve opens on the intake stroke
  - The exhaust valve closes on the exhaust stroke.
2057. During overhaul, reciprocating engine intake and exhaust valves are checked for stretch
- with a suitable outside micrometer caliper
  - with a suitable vernier caliper \*
  - with a suitable vernier caliper
  - by placing valve on a surface plate and measuring its length with a vernier height gauge.
2058. The fuel/air mixture is ignited in a conventional reciprocating engine
- when the piston has reached top dead centre of the intake stroke
  - just as the piston begins the power stroke
  - shortly before the piston reaches the top of the compression stroke \*
  - when the piston reaches top dead centre compression stroke.
2059. Ignition occurs at 28° B.T.C. in a four-stroke cycle engine, and the intake valve opens at 15° B.T.C. How many degrees of crankshaft travel after ignition does the intake valve open ? (consider one cylinder only).
- 70°
  - 373° \*
  - 347°
  - 13°.
2060. The purpose of the safety circuit generally installed on valve systems, is :
- to hold the valve guide in position
  - to hold the valve spring retaining washer in position
  - to prevent exhaust gases from entering the rocker box chamber
  - to prevent valve s from falling into the combustion chamber.\*
2061. While performing the valves of a fully assembled radial engine, what will be the result of failure to eliminate any backlash that may exist in the mechanism ?
- Valve lift will be less than specified
  - Inaccurate valve timing \*
  - Valve lift will be more than specified
  - Valve lap will be reduced.

2062. When the exhaust valve of a four-stroke cycle engine is closed and the intake valve is just closing, the piston is on the
- intake
  - power stroke
  - exhaust stroke
  - compression stroke.\*
2063. Out of the following factors those necessary in establishing the maximum compression ratio limitations of an aircraft engine are :
- Detonation characteristics of the fuel used
  - Design limitation of the engine
  - Degree of supercharging
  - Spark plug reach.
- One
  - Four
  - Two
  - Three.\*
2064. The purpose of the intake and exhaust valves of some engines designed to overlap is :
- to allow the engine to operate at a higher RPM
  - to allow the use of a four-lobe cam ring
  - to promote ease of starting
  - to improve the volumetric efficiency of the engine.\*
2065. If the hot clearance is used to set the valves when the engine is cold, what will occur during operation of the engine ?
- the valves will open early and close early
  - the valves will open late and close early \*
  - the valves will open early and close late
  - no ill effects will occur.
2066. What is the purpose of two or more valve springs in aircraft engines ?
- to reduce valve stretch
  - to equalise side pressure on the valve stems
  - to eliminate valve spring surge \*
  - to eliminate valve stem breakage.
2067. The reason for increase of smoothness of operation of an engine with a greater number of cylinders is :
- the power impulses are spaced closer together \*
  - the engine is heavier
  - the number of cylinders has nothing to do with the smoothness of operation
  - the engine has larger counterbalance weights.
2068. Compression ratio is the ratio between the
- cylinder volume with piston at bottom dead centre and at top dead centre \*
  - combustion chamber pressure on the combustion stroke and on the exhaust stroke
  - piston travel on the compression stroke and on the intake stroke
  - fuel and air in the combustion chamber.
2069. When inspecting engine ball bearings, it is necessary to check :
- Proper degree or hardness
  - Metal dissimilation
  - Bearing out-of-balance
  - Flaking or pitting of races.\*
2070. The proper end-gap clearance on new piston rings is assured during the major overhaul of an engine by
- using a go and no-go gauge
  - using rings specified by the engine manufacturer
  - placing the rings in the cylinder and in measuring the end-gap with a feeler gauge \*
  - grinding the rings on an energy wheel.
2071. The volume of a cylinder equals 80 cubic inches when the piston is at bottom centre. When the piston is at the top of the cylinder, the volume equals 10 cubic inches. What is the compression ratio ?
- 10:7
  - 1:7
  - 7:10
  - 7:1.\*
2072. The purpose of a power check on a reciprocating engine is ?
- to check magneto drop
  - to check the propeller governor
  - to determine satisfactory performance \*
  - to determine if the fuel/air mixture is adequate.
2073. When checking compression with the differential pressure tester, the test cannot be made with the piston at bottom dead centre because
- at any bottom dead centre position at least one valve will be open \*
  - the cylinder volume is at its maximum, thus giving the incorrect reading
  - you may damage the gauge
  - it is too dangerous.
2074. The excessive valve clearance of a cylinder on a reciprocating aircraft engine will cause
- reduce valve overlap period \*
  - increased cylinder pressure on the power stroke
  - intake and exhaust valves will open early and close late
  - none of these.
2075. The floating control thermostat is adjusted to maintain a normal engine oil temperature which will not vary more than approximately
- 10° to 13°C
  - 5° to 8° C \*
  - 5° to 8°F
  - 10° to 13°F.
2076. The condition which would indicate a general weak-engine condition when operated with a fixed-pitch propeller or test club is :
- oil pressure lower in idle RPM than at cruise RPM
  - lower than normal static RPM, full throttle operation.\*
  - manifold pressure lower at idle RPM than at static RPM
  - lower than normal manifold pressure for any given RPM.

2077. After spark plugs have been serviced, the position in which they should be reinstalled is :
- the same hole from which they were removed
  - next in firing order to the one from which they were removed
  - swapped bottom to top
  - next in firing order to the one from which they were removed and swapped bottom to top.\*
2078. The result of excessive valve clearance in the valves opening in
- early and closing early
  - late and closing early \*
  - early and closing late
  - late and closing late.
2079. A routine inspection of reciprocating engine was made and a deposit of small, bright, metallic particles which do not cling to the magnetic drain plug is discovered in the oil sump and on the surface of the oil filter. This condition
- may be a result of abnormal plain type bearing wear and is caused for further investigation \*
  - indicates accessory section gear wear and is cause for removal and/or overhaul
  - is probably result of ring and cylinder wall wear and is cause for engine removal and/or overhaul
  - all of these.
2080. How are the speed and direction of rotation of a fourlobe cam plate in relation to the crankshaft in a nine-cylinder radial engine ?
- One-eighth crankshaft speed and same direction
  - One-half crankshaft speed and opposite direction
  - One-eighth crankshaft speed and opposite direction \*
  - One-half crankshaft speed and same direction.
2081. The minimum number of crankshaft revolutions required to cause the five-lobe cam plate of nine-cylinder radial engine to turn one complete revolution is :
- Ten \*
  - Two
  - Four and one-half
  - Five.
2082. The purpose of dynamic suspension as applied to aircraft reciprocating engine installations is :
- to eliminate the torsional flexibility of the powerplant
  - to reduce the amplitude of the normal engine vibrations
  - to make the powerplant installation more rigid
  - to isolate normal power plant vibrations from the aircraft structure.\*
2083. When metallic particles are found on the oil screen during an engine inspection, it is an indication of
- normal engine wear unless the particles are nonferrous
  - the need to identify the cause before the aircraft is released for flight \*
  - normal engine wear unless the deposit exceeds a specified amount
  - normal engine wear unless the particles show ferritic content (respond to a magnet).
2084. The oil pressure gauge fluctuates over a wide range from zero to normal operating pressure. The most probable cause is
- malfunction of the thermostatic control valve
  - low oil supply \*
  - broke or weak pressure relief valve spring
  - air lock in the scavenge pump intake.
2085. If an overhead valve engine is operated with inadequate valve clearances, the result would be
- the valves will not open during start and engine warm-up
  - the valve will remain closed for longer periods than specified by the engine manufacturer
  - the valves will not seat positively during start and engine warm-up \*
  - the further decrease in valve clearance that occurs as engine temperatures increase will cause damage to the valve-operating mechanism.
2086. Excessive valve clearances will result in the duration of valve opening to
- increase for both intake and exhaust valves
  - decrease for both intake and exhaust valves \*
  - decrease for intake valve and increase for exhaust valve
  - increase for intake valves and decrease for exhaust valves.
2087. The valve overlap promotes :
- lower intake manifold pressure and temperatures
  - a backflow of gases across the cylinder \*
  - an overlap of the power and intake strokes
  - better scavenging and cooling characteristics.
2088. The indicated oil pressure of a particular drysump aircraft engine is higher at cruise RPM than at idle RPM. this indicates
- defective piston-oil control rings
  - excessive relief-valve spring tension
  - an insufficient oil supply
  - normal operation.\*
2089. The cam ring will turn slowest relative to the crankshaft is :
- one-lobe cam ring used on a 14-cylinder engine
  - two-lobe cam ring used on a five-cylinder engine
  - three-lobe cam ring used on a seven-cylinder engine
  - four-lobe cam ring used on a nine-cylinder engine\*



2090. It was found that an engine misses in both the right and left positions of the magneto switch. The quickest method for locating the trouble is to
- check for cold cylinders to isolate the trouble \*
  - perform a compression check
  - check for a weak breaker spring in the magneto
  - check each spark plug.
2091. A hissing sound from the exhaust stack when the propeller is being pulled through manually indicates
- a cracked exhaust stack
  - exhaust valve blown \*
  - worn piston rings
  - liquid lock.
2092. In case the oil pressure of a cold engine is higher than at normal operating temperatures, it is necessary that the
- oil system relief valve should be readjusted
  - engine's lubrication system is probably operating normally \*
  - oil dilution system should be turned on immediately
  - engine should be shut down immediately.
2093. The fuel/air mixture which will result in the highest engine temperature (all other factors remaining constant) is :
- a mixture leaner than a rich best-power mixture of .085
  - a mixture richer than a lean best-power mixture of .075
  - a mixture richer than a full-rich mixture of .087
  - a mixture leaner than a manual lean mixture of .060\*.
2094. If an engine cylinder is to be removed, the position in the cylinder where the piston should be is :
- bottom dead centre
  - top dead centre \*
  - halfway between top and bottom dead centre
  - any convenient position.
2095. The operating valve clearance of radial engine as compared to cold valve clearance is
- less
  - the same
  - greater \*
  - greater or less depending on the type of valve used.
2096. The firing order for a nine-cylinder radial engine is:
- 1,2,3,4,5,6,7,8,9
  - 1,2,3,8,4,7,5,6,9
  - 1,3,5,7,9,2,4,6,8 \*
  - 9,4,2,7,6,5,3,1,8.
2097. Engine operating flexibility is defined as the ability of the engine to
- deliver maximum horsepower at a specific altitude
  - meet exacting requirements of efficiency and low weight per horsepower ratio
  - run smoothly and give the desired performance at all speeds \*
  - expand and contract with changes in temperature and pressure.
2098. Standard aircraft cylinder oversizes usually range from 0.010 inch to 0.030 inch. But oversize of automobile engine cylinders may range up to 0.100 inch. This is because aircraft engine cylinders
- are limited as to the range of piston sizes available
  - have relatively thin walls and may be nitrided \*
  - cannot have ridging removed by grinding
  - operate at high temperatures.
2099. When the ignition switch is moved from BOTH to either LEFT or RIGHT during an engine ground check, normal operation is usually indicated by
- a large drop in RPM
  - a slight increase in RPM
  - no change in RPM
  - a slight drop in RPM \*
2100. The best indication of worn valve guides is :
- high oil consumption \*
  - low compression
  - low oil pressure
  - high oil pressure.
2101. The difference between detonation pre-ignition is :
- pre-ignition occurs in only a few cylinders at one time
  - detonation cannot be detected in an engine as easily as pre-ignition \*
  - pre-ignition will cause a loss of power, but will not damage an engine
  - detonation usually occurs in only a few cylinders at one time.
2102. The engine servicing operation which generally requires engine pre-oiling prior to starting the engine is :
- oil filter change
  - engine oil change
  - engine installation \*
  - replacement of oil lines.
2103. The condition which would most likely lead to detonation is :
- improper ignition timing
  - improper valve grinding at overhaul
  - use of fuel with too high an octane rating
  - use of fuel with too low an octane rating.\*
2104. Which of the following statements pertaining to fuel/air ratios is true ?
- the mixture ratio which gives the best power is richer than the mixture ratio which gives maximum economy \*
  - a lean mixture is faster burning than a normal mixture
  - a rich mixture is faster burning than a normal mixture
  - the mixture ratio which gives maximum economy may also be designated as best power mixture
2105. Backfiring through the carburetor generally results from the use of
- excessive manifold pressure
  - an excessively lean mixture \*
  - excessively atomized fuel
  - an excessively rich mixture.

2106. An engine would have an increased tendency to detonate because of
- using fuels with high combustion rate characteristics \*
  - retarding the spark advance
  - decreasing the density of the charge delivered to the cylinders
  - using a rich mixture.
2107. One of the best indicators of reciprocating engine combustion chamber problems is
- excessive engine vibration
  - low oil pressure
  - carburetor condition
  - spark plug condition.\*
2108. Excessive pressure buildup in the crankcase of a reciprocating engine could be caused by
- plugged crankcase breather \*
  - oil pump pressure adjusted too high
  - an excessive quantity of oil
  - worn oil scavenger pump.
2109. Excessive valve clearance in a piston engine
- increases valve overlap
  - has no effect on valve overlap
  - decreases valve overlap \*
  - none of these.
2110. The critical altitude is the highest altitude at which an engine will maintain (at the maximum continuous rotational speed) maximum
- peak horsepower
  - break horsepower
  - continuous horsepower \*
  - cruise horsepower .
2111. The fan rotational speed of a dual-axial compressor forward fan engine is the same as the
- accessory drive shaft
  - low-pressure compressor \*
  - forward turbine wheel
  - high-pressure compressor.
2112. The abbreviation "P" with subscript 17 used in jet engine terminology means
- the total inlet pressure
  - pressure and temperature at station No.7
  - seven times the temperature divided by the total pressure
  - the total pressure at station No. 7.\*
2113. The function of the nozzle diaphragm (gas turbine engine) located on the upstream side of the turbine wheel is :
- to increase the pressure of the exhaust mass
  - to increase the velocity of the heated gases flowing past the nozzle diaphragm \*
  - to direct the flow of gases parallel to the chord line of the turbine buckets
  - to decrease the velocity of the heated gases flowing past the nozzle diaphragm.
2114. The turbine engine section which provides for proper mixing of the fuel and air is :
- combustion section \*
  - compressor section
  - turbine section
  - accessory section.
2115. In a gas turbine engine, combustion occurs at a constant
- volume
  - pressure \*
  - velocity
  - density.
2116. Which of the following statements is true regarding gas turbine engines ?
- at the lower engine speeds, thrust increase rapidly with small increases in RPM
  - at the higher engine speed, thrust increases rapidly with small increases in RPM \*
  - gas turbine engines operate less efficiently at high altitudes due to the lower temperature encountered
  - the thrust delivered per pound of air consumed is less at high altitude than at low altitude than at low altitude.
2117. Some high-volume turboprop and turbo-jet engines are equipped with two-spool or split compressors. When these engines are operated at high altitudes, the
- throttle must be retarded to prevent over-speeding or the two compressor rotors due to the lower density air
  - low-pressure rotor will increase in speed as the compressor load decreases in the lower density air.\*
  - throttle must be retarded to prevent over-speeding of the high-pressure rotor due to the lower density air
  - low-pressure rotor will decrease in speed as the compressor load decreases in the lower density air.
2118. Gas turbine engines use a nozzle diaphragm which is located on the upstream side of the turbine wheel. One of the functions of this unit is
- to decrease the velocity of the heated gases flowing past this point
  - to direct the flow of gases parallel to the vertical line of the turbine buckets
  - to increase the velocity of the heated gases flowing past this point \*
  - to increase pressure of the exhaust mass.
2119. The highest gas pressure in a turbo-jet engine is located
- at the outlet of the tailpipe section
  - at the entrance of the turbine section
  - in the entrance of the burner section \*
  - in the outlet of the burner section.
2120. An exhaust cone placed at the duct of the turbine in jet engine will cause the pressure to
- increase and the velocity to decrease \*
  - increase and the velocity to increase
  - decrease and the velocity to increase
  - decrease and the velocity to decrease.

2121. The function of the stator vane assembly at the discharge end of a typical axial-flow compressor is :
- to reduce drag on the first stage turbine blades
  - to straighten airflow to eliminate turbulence \*
  - to direct the flow of gases into the combustion chambers
  - to increase air swirling motion into the combustion chambers.
2122. The function of turbines near the rear of a jet engine is:
- to compress air heated in the combustion section
  - to increase air velocity for propulsion
  - to circulate air to cool the engine
  - to drive the compressor section.\*
2123. Which of the following statements is true when a turbojet engine is started ?
- a hot start is indicated if the exhaust gas temperature exceeds specified limits \*
  - an excessively lean mixture is likely to cause a hot start
  - the engine should start between 60 to 80 seconds after the fuel shut off lever is opened
  - release the starter switch as soon as indication of flight-off occurs.
2124. In the dual axial-flow or twin spool compressor system, the first stage turbine drives the
- $N_1$  and  $N_2$  compressors
  - $N_4$  compressors
  - $N_2$  compressors \*
  - $N_1$  compressors.
2125. Cracks may occur in hot section components of a turbine engine if they are marked during inspection with
- lead pencil \*
  - chalk
  - layout dye
  - any of the above.
2126. The fan in most turbofan engines is driven by :
- the turbine that drives the high pressure compressor
  - the turbine that drives that low pressure compressor \*
  - a special turbine that drives nothing but the fan
  - an electric motor driven by electricity generated by the starter-generator.
2127. When starting a turbine engine, a hung start is indicated if the engine
- exhaust gas temperature exceeds specified limits
  - fails to reach idle RPM \*
  - RPM exceeds specified operating specified operating speed
  - pressure ratio exceeds specified operating limits.
2128. The two main sections of a turbine engine for inspection purposes are :
- combustion and exhaust
  - hot and cold \*
  - compressor and turbine
  - combustion and turbine.
2129. The two basic elements of the turbine section in a turbine engine are :
- Impeller and diffuser
  - Compressor and manifold
  - Bucket and expander
  - Stator and rotor.\*
2130. The primary function of the exhaust cone of a turbine engine is :
- Collect and exhaust gases into a solid low velocity exhaust vapor
  - Straighten the swirling exhaust gases
  - Collect and convert exhaust gases into a solid high velocity exhaust jet \*
  - Pipe the exhaust gases out of the airframe.
2131. The functional elements in a centrifugal compressor are :
- turbine and compressor
  - compressor and manifold
  - bucket and expander
  - impeller and diffuser.\*
2132. When the fuel control unit has been replaced on a turbine engine, it is necessary to
- retime the engine
  - recalibrate the fuel nozzles
  - retrim the engine \*
  - recheck the flame pattern.
2133. The most satisfactory method of attaching turbine blades to turbine wheels is :
- the fir-tree design \*
  - the tongue and groove design
  - high temp-high strength adhesive method
  - press fit method.
2134. A turbine engine compressor which contains vanes on both sides of the impeller is a
- single entry centrifugal compressor
  - double entry centrifugal compressor \*
  - double entry axial-flow compressor
  - single entry axial-flow compressor.
2135. The first engine instrument indication of a successful start of a turbine engine is :
- a decrease in the exhaust gas temperature
  - a rise in the engine fuel flow
  - a decrease in the engine pressure ratio
  - a rise in the exhaust gas temperature.\*
2136. Turbine discharge pressure is identified in service manuals and by engine instruments as
- pt. 7* \*
  - pt. 2*
  - Tt. 2*
  - Tt. 7*.
2137. The recommended operating time between overhauls (TBO) of a turbine engine used in general aviation is :
- the engine manufacturer \*
  - the operator working in conjunction with the FAA
  - the owner/operator
  - the FAA.

2138. The recommended operating time between overhauls (TBO) of a turbine engine used in air carrier operation is established by :
- the engine manufacturer \*
  - the operator working in conjunction with the FAA
  - the owner/operator
  - the FAA.
2139. Mandatory replacement times for critical components of turbine engines is established by :
- the owner/operator
  - the FAA
  - the operator working in conjunction with the FAA
  - the engine manufacturer.\*
2140. A dual axial-flow compressor improves the efficiency of a turbojet engine by :
- more turbine wheels can be used
  - combustion chamber temperatures are reduced
  - higher compression ratios can be obtained \*
  - the velocity of the air entering the combustion chamber is increased.
2141. Two basic types of turbine blades are
- reaction and converging
  - tangential and reaction
  - reaction and impulse \*
  - impulse and vector.
2142. Which statements is true in case of turboprop power plant propeller ?
- the plant is governed at the same speed as the turbine
  - the plant controls the speed of the engine in the beta range \*
  - the plant accounts for 75 to 85 percent of the total thrust output
  - the plant accounts for 15 to 25 percent of the total thrust output.
2143. An advantage of the axial-flow compressor is its
- low starting power requirements
  - low weight
  - high peak efficiency \*
  - high frontal area.
2144. The purpose of the stator blades in the compressor section of a turbine engine is :
- stabilise pressure
  - prevent compressor surge
  - control direction of the airflow \*
  - increase velocity of the airflow
2145. The purpose of the diffuser section in a turbine engine is :
- to increase pressure and reduce velocity \*
  - to speed up the airflow in the turbine section
  - to convert pressure to velocity
  - to reduce pressure and increase velocity.
2146. The stress rupture cracks usually appear on turbine blades of turbo-jet engines
- across the blade root, parallel to the fir tree
  - along the trailing edge, parallel to the edge
  - along the leading edge, parallel to the edge
  - across the leading or trailing edge at a right angle to the edge length.\*
2147. The type of turbine engine combustion chamber is which the case and linear are removed and installed as one unit during routine maintenance, is :
- can \*
  - can annular
  - variable
  - annular.
2148. The diffuser section of a jet aircraft engine is located between
- the burner section and the turbine section
  - the  $N_1$  section and the  $N_2$  section
  - station No. 7 and station No. 8
  - the compressor section and the burner section.\*
2149. The most common type of thrust reversers used on turbine-engine-powered aircraft is :
- convergent and divergent
  - rotary air vane and stationary air vane
  - mechanical blockage and aerodynamic blockage\*
  - cascade vane and blocked door.
2150. The leading edge of a first-stage turbine blade is found to have stress rupture cracks. Which of the following should be suspected ?
- airseal wear
  - faulty cooling shield
  - over temperature condition \*
  - overspeed condition.
2151. The ultimate limiting factor of turbojet engine operation is :
- compressor inlet air temperature
  - compressor outlet air temperature
  - turbine inlet temperature \*
  - burner-can pressure.
2152. The turbine shaft is usually joined to the compressor rotor of a centrifugal compressor turbine engine by:
- bolted coupling
  - keyed coupling
  - welded coupling
  - splined coupling.\*
2153. The engine variable which is the most critical during turbine engine operation is :
- compressor inlet air temperature
  - compressor RPM
  - burner-can pressure
  - turbine inlet temperature.\*
2154. Reduced blade vibration and improved airflow characteristics in gas turbines are brought about by
- fir free blade attachment
  - impulse type blades
  - shrouded turbine rotor blades \*
  - bulb root attachment.

2155. The turbojet engine compressors which offers the greatest advantages for both starting flexibility and improved high-altitude performance is :
- singlestage, centrifugal-flow
  - dual-stage, centrifugal-flow
  - split spool, axial flow \*
  - single-spool, axial-flow.
2156. Turbojet engine turbine blades removed for detailed inspection must be re-installed in
- a slot 180° away
  - a slot 90° clockwise
  - a slot 90° counterclockwise
  - the same slot.\*
2157. What is an advantage of the centrifugal-flow compressor ?
- high frontal area
  - high pressure rise per stage \*
  - high ram efficiency
  - high peak efficiency.
2158. The highest heat-to-metal contact in a jet engine is the
- burner cans
  - exhaust cone
  - turbine inlet guide vanes \*
  - turbine blades.
2159. The two elements which make up the axial-flow compressor assembly is :
- rotor and stator \*
  - rotor and diffuser
  - compressor and manifold
  - stator and diffuser.
2160. The two types of centrifugal compressor impellers are
- single stage and two stage
  - single entry and double entry \*
  - rotor and stator
  - impeller and diffuser.
2161. Between each row of rotating blades in a turbine engine compressor, there is a row of stationary blades which act to diffuse the air. These stationary blades are known as
- buckets
  - expanders
  - diffuser blades
  - stators.\*
2162. When aircraft turbine blades are subjected to excessive temperatures, the type of failures which can happen are :
- compression and torsion
  - bending and torsion
  - torsion and tension
  - stress rupture.\*
2163. Dirty compressor blades in turbine engine could lead to :
- low RPM
  - low EGT
  - high RPM
  - high EGT.\*
2164. The two types of compressors most commonly used in jet engines are :
- axial and root
  - centrifugal and reciprocating
  - root and centrifugal
  - centrifugal and axial.\*
2165. A purpose of the shrouds on the turbine blades of an axial-flow engine is to:
- reduce vibration \*
  - shorten run-in time
  - increase tip speed
  - reduce air entrance.
2166. In a dual axial-flow compressor, the first stage turbine drives :
- N<sub>2</sub> compressor \*
  - N<sub>1</sub> compressor
  - low pressure compressor
  - both low and high pressure compressors.
2167. If a turbine engine catches fire during starting, it is necessary to
- turn off the fuel and continue cranking \*
  - disengage starter immediately
  - continue starting attempt to blow out fire
  - place power lever to exhaust fuel fumes.
2168. In flight turbine engine flameouts are usually caused by
- high exhaust gas temperature
  - interruption of the inlet airflow \*
  - fouling of the primary igniter plugs
  - fuel-nozzle clogging.
2169. The units in a gas turbine engine which aid in stabilisation of the compressor during low thrust engine operations are :
- bleed air valves \*
  - stator vanes
  - inlet guide vanes
  - pressurization and dump valves.
2170. In a turbine engine with a dual-axial compressor, the low-speed compressor
- always turns at the same speed as the high speed compressor
  - is connected directly to the high speed compressor
  - seek its own best operating speed \*
  - has a higher compressor shaft speed than the high speed compressor.
2171. Hot spots on the tail cone of a turbine engine are obserbed. These are possible indicators of a malfunctioning fuel nozzle of
- a faulty combustion chamber \*
  - a loose inlet air guide vane
  - a faulty igniter plug
  - an improperly positioned tail cone.

2172. The function of stator vanes in an axial-flow compressor is :
- to convert velocity energy into pressure energy \*
  - to convert pressure energy into velocity energy
  - to direct air into the first stage rotor vanes at the proper angle
  - to pick up air and add energy as it accelerate outward by centrifugal force.
2173. As air flows through a convergent nozzle, the velocity
- decreases
  - remains constant
  - is inversely proportional to the temperature
  - increases.\*
2174. As air flows through a divergent nozzle, the velocity
- increases
  - remain constant
  - is inversely proportional to the temperature
  - decreases \*
2175. As air flows through a convergent nozzle, this pressure
- increases
  - decreases \*
  - remains constant
  - none of these.
2176. As air flows through the divergent nozzle, the pressure
- decreases
  - remains constant
  - increase \*
  - none of these.
2177. Anti-icing of turbojet engine air inlets is obtained by
- electrical heating elements inside the inlet guide vanes
  - hot air ducted over the outside of the inlet guide vanes
  - engine bleed air ducted through the critical areas\*
  - electrical heating elements located within the engine air inlet cowling.
2178. When starting a turbojet engine, the starter should be disengaged when the
- engine lights are off
  - engine reaches idle RPM \*
  - RPM indicator show 100 percent
  - ignition and fuel system are activated.
2179. The primary advantage of an axial-flow compressor over a centrifugal compressor is :
- easier maintenance
  - high frontal area
  - less expensive
  - greater pressure ratio\*
2180. The purpose of blow-in doors in the induction system of a turbine engine aircraft is :
- admit air to the engine compartment during ground operation when the engine air requirements are in excess of the amount the normal intake system can supply.\*
  - fire extinguisher access openings
  - admit air to the engine compartment during flight when the aircraft attitude is not conducive for ram air effect
  - none of these.
2181. A double entry centrifugal compressor is :
- a compressor that has two intakes
  - a two-stage compressor independently connected to the main shaft
  - two compressors and two impellers
  - a compressor with vanes on both sides of the impeller.\*
2182. The major function of the turbine assembly in a turbojet engine is :
- it compresses the air before it enters the combustion section
  - it directs the gases in the proper direction to the tailpipe
  - it supplies the power to turn the compressor \*
  - it increases the temperature of the exhaust gases.
2183. The function of stator blades in the compressor section of an axial-flow turbine engine is :
- to increase the air velocity and prevent swirling
  - to straighten the airflow and accelerate it
  - to decrease the air velocity and prevent swirling \*
  - to prevent compressor surge.
2184. The three main sections of a gas turbine engine are :
- compressor, diffuser, and scavenge
  - turbine, combustion, and scavenge
  - combustion, compressor, and inlet guide vane
  - compressor, combustion, and turbine.\*
2185. The type of turbine blade most commonly used in aircraft jet engines is :
- reaction
  - divergent
  - impulse
  - reaction-impulse.\*
2186. The primary factor which controls the pressure ratio of an axial-flow compressor is :
- number of stages in compressor \*
  - rotor diameter
  - compressor inlet pressure
  - compressor inlet temperature.
2187. The air passing through the combustion chamber of a jet engine is
- used to support combustion and to cool the engine\*
  - entirely combined with fuel and burned
  - speeded up and heated by the action of the turbines
  - circulated in the combustion chamber until consumed.
2188. The highest velocity of gas flowing through a gas turbine engine is obtained in the
- turbine
  - compressor
  - diffuser \*
  - combustor.
2189. As the airspeed of an airplane increase, the thrust produced by a turbo fan engine
- increases
  - decreases \*
  - remains the same
  - decreases inversely with the speed of the airplane.

2190. The function of stators in the turbine section of a gas turbine engine is :
- to increase the velocity of the air \*
  - to decrease the velocity of the air
  - to increase the pressure of the air
  - none of these.
2191. The function of compressor stators in a gas turbine engine act as diffusers is:
- to decrease the velocity of the gas flow \*
  - to increase the velocity of the gas flow
  - to decrease the velocity and decrease the pressure of the gas
  - to increase the velocity and decrease the pressure of the gas.
2192. Which procedure is used for removing the accumulation of dirt deposit on compressor blades ?
- the soak method
  - field cleaning \*
  - the purging process
  - reversed cleaning.
2193. The main sections of a turbojet engine are :
- fan, combustion, and exhaust
  - compressor, combustion and diffuser
  - compressor, combustion, and diffuser \*
  - inlet, combustion, and turbine.
2194. The possible cause when turbojet engine indicates no change in power setting parameters, but oil temperature is high is :
- unused scavenge pump oil flow
  - engine main bearing distress \*
  - gearbox seal leakage
  - high oil sump pressure.
2195. Newton's First Law of Motion states :
- to every action there is an equal and opposite reaction
  - force is proportional to the product of mass and acceleration
  - every body persists in its state of rest, or of motion in a straight line, unless acted upon by some outside force \*
  - force applied to an object at any point is transmitted in every direction without loss.
2196. The kind of damage to which a turbine engine hot section is particularly susceptible is :
- scoring
  - pitting
  - cracking \*
  - galling.
2197. In which of the following dirt particles in the air being introduced into the compressor of a turbine engine will not form a coating ?
- turbine blades \*
  - compressor blades
  - casings
  - inlet guide vanes.
2198. Sever rubbing of turbine engine compressor blades with usually results in
- bowing
  - cracking
  - buring
  - galling.\*
2199. The parameter which influences the operation of an automatic fuel control unit on a turbojet engine is :
- fuel temperature
  - burner pressure \*
  - mixture control position
  - exhaust gas temperature.
2200. A turbojet engine having high exhaust gas temperature at desired engine pressure ratio for takeoff indicates
- that the engine is out of trim \*
  - that the fuel control should be replaced
  - compressor bleed valve malfunction
  - drain valve malfunction.
2201. The Brayton cycle is a constant
- pressure cycle \*
  - volume cycle
  - temperature cycle
  - mass cycle.
2202. Water is injected into a turbojet engine for cooling purposes in
- compressor air inlet or diffuser \*
  - second-stage compressor or turbine
  - burner can
  - fuel control.
2203. Continued and/or excessive heat and centrifugal force on turbine engine compressor blades usually cause
- profile
  - growth \*
  - grouging
  - galling.
2204. When the RPM of an axial-flow compressor remains constant, the angle of attack of the rotor blades can be changed by
- changing the velocity of the airflow \*
  - changing the compressor diameter
  - increasing the pressure ratio
  - decreasing the pressure ratio.
2205. The compression ratio of an axial-flow compressor is a function of the
- number of compressor stages \*
  - rotor diameter
  - diffuser area
  - air inlet velocity.
2206. The reason for some turbine engines to have more than one turbine wheel attached to a single shaft is :
- to facilitate balancing of the turbine assembly
  - to straighten the airflow before it enters the exhaust area
  - to help stabilize the pressure between the compressor and the turbine
  - to extract more power from the exhaust gases than a single wheel can absorb.\*
2207. The types of combustion sections are used in aircraft turbine engines are :
- variable, can-annular, and cascade vane
  - annular, variable, and cascade vane
  - can, multiple-can, and variable
  - multiple-can, annular, and can-annular.\*

2208. A turbine engine requires a cool-off period before shutting it down because
- to allow the surfaces contacted by the lubricating oil to return to normal operating temperature
  - to burn off excess fuel ahead of the fuel control
  - to allow the turbine wheel to cool before the case contracts around it \*
  - to avoid seizure of the engine bearings.
2209. The numbers of igniters normally used on a turbine engine having nine burner cans is:
- one
  - two \*
  - three
  - nine.
2210. A shrouded turbine consists of :
- the turbine blades are shaped so that their ends form a band or shroud \*
  - each turbine wheel is enclosed by a separate housing or shroud
  - the turbine wheel is enclosed by a protective shroud to contain the blades in case of failure
  - the turbine wheel has a shroud or duct which provides cooling air to the turbine blades.
2211. The term used to describe a permanent and commutative deformation of the turbine blades of a turbojet engine is :
- stretch
  - elongation
  - distortion
  - creep.\*
2212. The purpose of the pressurization and dump valve used on turbojet engines is :
- it controls the pressure of the compressor outlet by dumping air when pressure reaches an established level
  - it allows fuel pressurization of the engine when starting and operating and dumps fuel pressure at engine shutdown \*
  - it controls compressor stall by dump; in compressor air under certain conditions
  - it maintains fuel pressure to the fuel control valve and dumps excessive fuel back to the fuel tanks.
2213. The stage in a turbojet engine at which pressures are the greatest is :
- compressor inlet
  - turbine outlet
  - compressor outlet \*
  - tailpipe
2214. The section of a turbojet engine where the jet nozzle located is :
- combustion
  - turbine
  - compressor
  - exhaust.\*
2215. A turbojet engine is removed for maintenance or test cell operation, It should be accomplished
- under the supervision of FAA personnel
  - in accordance with the manufacturer's instructions\*
  - by the aircraft owner or operator
  - by any FAA certificated repair station.
2216. Hot spots in the combustion section of a turbojet engine are observed, These possibly indicates
- foreign object damage
  - faulty igniter plugs
  - dirty compressor blades
  - malfunctioning fuel nozzles.\*
2217. In the Cessna 180 aircraft having a McCauley propeller Model No. 2A 34C50/90 A, the propeller is severely damaged in a ground accident. This model propeller is not available for replacement. Which of the following should be used to find a approved alternate replacement?
- summary of supplemental type certificates
  - approved aircraft equipment list
  - aircraft specifications/Type Certificate Data Sheets.\*
  - aircraft engine and propeller specifications/Type Certificate Data Sheets
2218. The parameter used to monitor the mechanical integrity of the turbines, as well as to check engine operating conditions of a turbojet engine is :
- engine oil pressure
  - exhaust gas temperature \*
  - engine oil temperature
  - engine pressure ratio.
2219. The instrument on a jet engine used to determine engine power is :
- turbine inlet temperature gauge
  - compressor RPM gauge
  - engine pressure ratio gauge \*
  - exhaust gas temperature gauge.
2220. Engine pressure ratio is determined by
- multiplying engine inlet total pressure by turbine outlet total pressure
  - multiplying turbine outlet total pressure by engine inlet total pressure
  - dividing turbine outlet total pressure by engine inlet total pressure \*
  - dividing engine inlet total pressure by turbine outlet total pressure.
2221. Jet engine thermocouples are usually made of
- iron-chromel
  - chromel -alumel \*
  - iron-constantan
  - alumel-constantan.
2222. A Bourdon-tube instrument is used to indicate
- pressure \*
  - temperature
  - position
  - all of these.
2223. A change in engine manifold pressure has a direct effect on the
- piston displacement
  - compression ratio
  - valve overlap period
  - mean effective cylinder pressure.\*



2224. The instrument on a gas turbine engine which should be monitored to minimize the possibility of a "hot" start is :
- RPM indicator
  - turbine inlet temperature \*
  - horsepower meter
  - torque meter.
2225. The oil temperature indicator on a gas turbine engine indicates the oil temperature
- at the inlet of the oil pressure pump \*
  - as the oil leaves the oil cooler
  - at the main bearing cavity
  - as the oil enters the oil reservoir.
2226. On a turbine engine, with a fixed power lever position, the application of engine anti-icing will result in
- a decrease in EPR \*
  - a false EPR reading
  - an increase in EPR
  - a modulation of the EPR.
2227. Engine pressure ratio is defined as the total pressure ratio between the
- front of the compressor and the rear of the compressor
  - aft end of the compressor and aft end of the turbine
  - front of the compressor and the rear of the turbine\*
  - front of the engine inlet and the aft end of the compressor.
2228. Gas turbine engine tachometers are usually
- driven from the main engine shaft
  - a direct indication of the accessory drive shaft RPM
  - driven by the quill shaft which indicates RPM of the turbine
  - calibrated in percent RPM.\*
2229. The primary purpose of tachometer on an axial-compressor turbine engine is :
- monitor engine RPM during cruise conditions
  - the principle instrument for establishing thrust settings
  - monitor engine RPM during starting and to indicate overspeed conditions \*
  - monitor power settings to prevent overtemp.
2230. The instrument which indicates the thrust of a gas turbine engine is :
- torque meter
  - exhaust gas temperature indicator
  - turbine inlet temperature indicator
  - engine pressure ratio indicator.\*
2231. In a turbine engine, the turbine discharge pressure indicator sensor is located at
- the end of the compressor section
  - a location in the exhaust cone that is determined to be subjected to the highest pressures
  - the eighth stage bleed air port
  - immediately after the last turbine stage.\*
2232. Turbine engine tachometers are calibrated in
- percent of engine RPM \*
  - Actual engine RPM
  - pounds per square inch (PSI)
  - percent of engine pressure ratio.
2233. The fire detectors commonly used in the power section of an engine nacelle are :
- CO detectors
  - combustible mixture detectors
  - smoke detectors
  - rate-of-temperature-rise detectors.\*
2234. The function of a fire detection system is :
- to discharge the powerplant fire-extinguishing system at the origin of the fire
  - to warn of the presence of the fire in the rear section of the powerplant
  - to activate a warning device in the event of a power plant fire \*
  - to identify the location of a power plant fire.
2235. Most aircraft turbine engine fire extinguishing systems are activated by :
- electrically discharged cartridges \*
  - manual remote control valve
  - piston stem and plunger
  - pushrod assembly.
2236. Carbon dioxide extinguishes an engine fire because
- the spray lowers the temperature to a point where combustion will not take place
  - the spray liquefies in the heat and smothers the fire by shutting off the oxygen supply
  - the high-pressure spray flushes the fire from the engine
  - contact with the air converts the liquid into a gas and snow which smothers the flames.\*
2237. What retains the nitrogen charge and fire extinguishing agent in a high rate of discharge (HRD) container ?
- breakable disk and fusible disk \*
  - pressure switch and check tee valve
  - pressure gauge and cartridge
  - discharge plug body and strainer.
2238. A continuous-loop fire detector is a
- spot detector
  - overheat detector \*
  - rate-of-temperature-rise detector
  - radiation sensing detector.
2239. How is the fire-extinguishing agent distributed in the engine section ?
- perforated turbine and slinger rings
  - spray nozzles and fluid pumps
  - nitrogen pressure and slinger rings
  - spray nozzles and perforated tubing.\*

2240. The safest fire-extinguishing agent of use from and stand point of toxicity and corrosion hazards is :
- carbon dioxide \*
  - methyl bromide
  - bromochloromethane
  - water.
2241. Which of the following is not used to detect fires in reciprocating engine nacelles ?
- smoke detectors \*
  - overheat detectors
  - rate of temperature-rise detectors
  - flame detectors.
2242. The most satisfactory extinguishing agent for a carburetor or intake fire is
- carbon dioxide \*
  - dry chemical
  - methyl bromide
  - carbon tetrachloride.
2243. The explosive cartridge in the discharge valve of a fire-extinguisher container is
- a life-dated unit \*
  - not a life-dated unit
  - interchangeable between bottles
  - mechanically fired.
2244. A gasoline or oil fire is defined as a
- class A fire
  - class B fire \*
  - class D fire
  - class C fire.
2245. The most satisfactory extinguishing agent for an electrical fire is
- water
  - carbon tetrachloride
  - carbon dioxide
  - methyl bromide.\*

### OIL SYSTEMS

2246. The time in seconds required for exactly 60 cubic centimeters of oil to flow through an accurately calibrated orifice at a specific temperature is recorded as a measurement of the oil's
- flash point
  - specific gravity
  - viscosity \*
  - pour point.
2247. Lubricating oils with high viscosity index ratings are those
- in which the viscosity does not vary much with temperature change \*
  - in which the viscosity varies considerably with temperature change
  - which have high pour points
  - which have high SAE numbers.
2248. Synthetic lubricants are used in high performance turbine engines because
- synthetic oils do not require filtering and are less expensive
  - the load-carrying characteristics of petroleum-base oils have a low degree of chemical stability
  - additives required in turbine engines cannot be mixed with petroleum oils
  - they have less tendency to produce lacquer or coke and less tendency to evaporate at high temperatures.\*
2249. High viscosity lubricating oil is used in most aircraft engines because
- the reduced ability of thin oils to maintain adequate film strength at altitude (reduced atmospheric pressure).
  - the relatively high rotational speeds
  - large clearances and high operating temperatures\*
  - its lower oxidation rate at elevated temperatures.
2250. If all other requirements can be met, the type of oil used to achieve theoretically perfect engine lubrication should be ?
- the thinnest oil that will stay in place and maintain a reasonable film strength \*
  - an oil that combines high viscosity and low demulsibility
  - the thickest oil that will stay in place and maintain a reasonable film strength
  - an oil that combines a low viscosity index and a high neutralization number.
2251. In addition to preventing metal-to-metal contact of moving parts, an engine lubricant aids in how many of the following ?
- cooling
  - sealing
  - cleaning
  - Corrosion prevention.
- one
  - two
  - three
  - four.\*
2252. The type of lubricating oil that is fed in a turbine aircraft engine is
- synthetic \*
  - petroleum
  - 50-50 blend of petroleum and synthetic
  - 30-70 blend of petroleum and synthetic.
2253. When selecting an engine oil, the important characteristic is ?
- high pour point
  - low flash point
  - high flash point \*
  - low degree of chemical stability.
2254. The viscosity of a liquid is a measure of its
- resistance to flow \*
  - rate of change of internal friction with change in temperature
  - density
  - ability to transmit force.
2255. The type of oil system usually found on turbojet engines is :
- dry sump, pressure, and spray \*
  - wet sump, dip, and pressure
  - dry sump, dip and splash
  - wet sump, spray, and splash.

2256. The engine's lubricating oil aids in reducing friction, cushioning shock, and
- cooling the engine \*
  - preventing fatigue of engine parts
  - heating fuel in carburetor to prevent ice
  - preventing a buildup of internal pressures in the crankcase.
2257. The factor which determines the proper grade of oil to use in a particular engine is :
- high viscosity to provide good flow characteristics
  - adequate lubrication in various attitudes of flight
  - positive introduction of oil to the bearings
  - operating speeds of bearings.\*
2258. Specific gravity is a comparison of the weight of a substance to the weight of an equal volume of
- oil at a specific temperature
  - distilled water at a specific temperatures \*
  - mercury at a specific temperature
  - isopropyl at a specific temperature.
2259. The factor which has the greatest effect on the viscosity of lubricating oil is :
- temperature \*
  - lubricity
  - pressure
  - volatility.
2260. The advantage of mineral base lubricants over vegetable oil base lubricants when used in aircraft engines is :
- cooling ability
  - sealing quality
  - chemical stability \*
  - friction resistance.
2261. The functions of the lubricating oil in an aircraft engine is :
- lubricates, cools, cleans, and prevents fatigue of parts
  - lubricates, cools, seals, and prevents internal pressure buildup
  - lubricates, seals, cools, and cleans \*
  - lubricates and increase friction between moving parts.
2262. In the oil system, the temperature bulb is normally located :
- at the oil supply tank inlet
  - in the scavenger pump inlet
  - at the Y drain in all engines
  - in the pressure oil screen housing.\*
2263. In a newly installed engine, if the oil pump runs but will not pump oil, the supply of oil is sufficient, and there are no leaks in the oil lines, then
- the pump has excessive side clearance \*
  - an air lock in the relief valve is indicated
  - the pressure relief valve is struck closed
  - the pump should be replaced with a new one.
2264. The purpose of the last chance oil filters is :
- to allow the oil to bypass the main filter in the event it becomes clogged
  - to prevent damage to the oil spray nozzle
  - to filter the oil immediately before it enters the main bearings \*
  - to assure a clean supply of oil to the lubrication system.
2265. In an axial-flow turbine engine, compressor bleed-air is sometimes used to aid in cooling the
- oil
  - inlet guide vanes
  - oil cooler
  - turbine.\*
2266. Oil picks up the most heat from which of the following turbojet engine components ?
- rotor coupling
  - compressor bearing
  - accessory drive bearing
  - turbine bearing.\*
2267. The function of the fuel-oil heat exchange on a turbojet engine is ;
- to remove oil vapors
  - to aerate the fuel
  - to emulsifies the oil
  - to increases fuel temperature.\*
2268. Fixed orifice nozzles are used in the lubrication system of gas turbine engines because
- to provide a relatively constant oil flow to the main bearings at all engine speeds \*
  - to keep back pressure on the oil pump, thus preventing an air lock
  - to protect the oil seals by preventing excessive pressure from entering the bearing cavities
  - to reduce the oil pressure.
2269. The primary purpose of the oil-to-fuel heat exchanger is :
- cool the fuel
  - cool the oil \*
  - de-aerate the oil
  - decrease the viscosity of the oil.
2270. The primary purpose of the oil breather pressurization system that is used on turbine engines is :
- positive pressure prevents contaminants from entering the system
  - prevents foaming of the oil
  - allows aeration of the oil for better lubrication because of the air/oil mist
  - provides a proper oil spray pattern from the main bearing oil jets.\*
2271. The purpose of an oil cooler bypass valve in a dry sump engine is :
- to direct cold oil into the oil supply tank \*
  - to direct cold oil to the intake side of the pressure pump
  - to direct hot oil into the oil supply tank
  - to direct cold oil into the oil filter.

2272. In order to relieve excessive pump pressure in an engine's internal oil system most engines are equipped with a
- vent
  - bypass valve
  - breather
  - relief valve.\*
2273. The factor that has the least effect on the oil consumption of a specific engine is :
- mechanical efficiency \*
  - engine temperature
  - engine RPM
  - lubricant characteristics.
2274. As an air to cold-weather starting, the oil dilution system thins the oil with
- propane
  - kerosene
  - alcohol
  - gasoline.\*
2275. Cylinder walls are usually lubricated by
- splashed or sprayed oil \*
  - a direct pressure system fed through the crankshaft, connecting rods, and the piston pins to the oil control ring groove in the piston
  - oil that is picked up by the oil control ring when the pistons is at bottom centre
  - oil migration past the rings during the intake stroke,
2276. If a full-flow oil filter is used on a aircraft engine, and the filter becomes clogged, the
- pressure buildup in the filter will collapse the screen and close off the oil supply to the engine
  - oil will be by passed to the magnetic oil sump plug where metallic particles will be removed
  - oil will be bypassed back to the oil tank hopper where sediment and foreign matter will settle out prior to passage through the engine
  - by pass valve will open and oil pump will supply unfiltered oil to the engine.\*
2277. How is oil accumulation in the cylinders of an inverted in line engine and in the lower cylinders of a radial engine normally reduced or prevented ?
- reversed oil control rings
  - closing the oil shutoff valve after shutdown
  - routing the valve-operating mechanism lubricating oil to a separate scavenger pump
  - extended cylinder skirts.\*
2278. The primary purpose of the hopper located in the oil supply tank of some dry-sump engine installations is :
- to reduce the time required to warm the engine to operating temperatures \*
  - to reduce surface aeration of the hot oil and thus reduce oxidation and the formation of sludge and varnish
  - to cause warm oil to mix with the cold oil without stratification and subsequent variation in viscosity
  - to impart a centrifugal motion to the oil entering the tank so that the foreign particles in the oil will separate more readily.
2279. The purpose of the flow control valve in a reciprocating engine oil system is :
- direct oil through or around the oil cooler \*
  - deliver cold oil to the hopper tank
  - relieve excessive pressures in the oil cooler
  - compensate for volumetric increases due to foaming of the oil.
2280. The piston pins of most aircraft engines are lubricated by :
- pressure oil through a drilled passageway in the heavy web portion of the connecting rod
  - oil which is sprayed or thrown by the master or connecting rods \*
  - the action of the oil controlling and the series of holes drilled in the ring groove directing oil to the pin and piston pin boss
  - pressure oil through a drilled passage the entire length of the linkrod.
2281. An engine lubrication system pressure relief valve is usually located between the
- oil cooler and the scavenger pump
  - scavenger pump and the external oil system
  - pump and the internal oil system \*
  - sump and the scavenger pump.
2282. If oil became congealed in a cooler, the unit which would prevent damage to the cooler is :
- core
  - thermostatic control valve \*
  - annular jacket
  - baffle plates.
2283. What is the primary source of oil contamination in a normally operating radial aircraft engine ?
- metallic deposit as a result of engine wear
  - atmospheric dust and pollen
  - combustion deposits due to combustion chamber blow by and oil migration on the cylinder walls
  - oil decomposition as a result of exposure to oxygen in the air.\*
2284. The type of valve which prevents oil from entering the main accessory case when the engine is not running is
- bypass
  - relief
  - check \*
  - restriction.
2285. If an oil tank having a capacity of 5 gallons, it must have an expansion space of
- 3 quarts
  - 2 quarts \*
  - 4 quarts
  - 5 quarts.
2286. Oil tank flapper valves are most likely to be closed when the aircraft is
- flying at a constant speed
  - taking off
  - increasing speed
  - decreasing speed.\*

2287. The bearing which must be continuously lubricated by pressure oil is :
- ball
  - roller
  - tapered
  - friction.\*
- IGNITION SYSTEM**
2288. When a magneto is disassembled, keepers are usually placed across the poles of the rotating magnet to reduce the loss of magnetism. These keepers are usually made of
- chrome magnet steel
  - soft iron \*
  - cobalt steel
  - laminated high-carbon steel.
2289. The strength of a magneto magnet is checked as :
- hold the points open and check the output of the primary coil with an a.c. ammeter while operating the magneto at a specified speed \*
  - check the a.c. voltage reading at the breaker point
  - check the output of the secondary coil with an a.c. ammeter while operating the magneto at a specified speed
  - while operating the magneto at any speed, determine the size of air gap the spark from the magneto will jump.
2290. The dwell angle of a magneto is :
- the angle between full resistor and neutral position
  - the distance in degrees the cam travels while the breaker points are open
  - the angle at which the rotating magnet and the field windings produce their highest voltage
  - the angle between breaker cam lobe during which the points are closed.\*
2291. When timing a magneto internally, the alignment of the timing marks indicates that the
- breaker points are just closing
  - magnets are in the neutral position
  - magnets are in the E-gap position \*
  - breaker points are open to their widest gap.
2292. When internally timing a magneto, the breaker points begin to open when the rotating magnet is
- in the neutral position
  - fully aligned with the pole shoes
  - a few degrees past full alignment with the pole shoes
  - a few degrees past the neutral position.\*
2293. The electrical location of the primary condenser in a high-tension magneto is
- across the ignition switch
  - across the breaker points \*
  - in series with the breaker points
  - between the ignition switch and the breaker points.
2294. The radial location of the two north poles of a four-pole rotating magnet in a high-tension magneto is
- 180° apart \*
  - 270° apart
  - 90° apart
  - 45° apart.
2295. The material used for construction of magneto pole shoes is
- laminations of high-grade soft iron \*
  - laminations of high-grade steel
  - strips of extremely hard steel
  - pieces of high-carbon iron.
2296. In an aircraft ignition system, one of the functions of the condenser is to
- regulate the flow of current between the primary and secondary coil
  - facilitate a more rapid collapse of the charge in the primary coil \*
  - act as a safety gap for the secondary coil
  - none of these.
2297. As an aircraft engine's speed is increased, the voltage induced in the primary coil of the magneto
- remains constant
  - increases \*
  - varies with the setting of the voltage regulator
  - decreases.
2298. The purpose of a safety gap in a magneto is ?
- to prevent burning out the primary winding
  - to protect the high-voltage winding from damage\*
  - to prevent arcing across spark plug electrodes
  - to prevent burning of contact points.
2299. A defective primary condenser in a magneto is indicated by
- broken breaker points
  - a fine-grained frosted appearance of the breaker points
  - burned and pitted breaker points \*
  - a weak spark.
2300. The number of secondary coils required in a low tension ignition system on an 18-cylinder engine is
- 36 \*
  - 4
  - 18
  - 9.
2301. A magneto ignition switch is connected
- in series with the breaker points
  - in series with both the breaker points and the primary condenser
  - in parallel to the breaker points \*
  - in series with the primary condenser and parallel to the breaker points.
2302. The spark is produced in a magneto ignition system when the breaker points are
- beginning to close
  - fully open
  - beginning to open \*
  - fully closed.

2303. The function of shielding used on spark plug and ignition wires is :
- to prevent leakage of current which results in a weak spark
  - to protect the wires from short circuits as a result of chafing and rubbing
  - to protect the wires from oil and grease
  - to prevent interference with radio reception.\*
2304. The purpose of staggered ignition is to compensate for
- long ignition harness
  - short ignition harness
  - rich fuel/air mixture around exhaust valve
  - diluted fuel/air mixture around exhaust valve.\*
2305. Most aircraft magneto housings are ventilated because they
- allow excess lubricating oil to drain from the magneto housing
  - equalize the pressure inside and outside the magneto housing during flight to prevent the entrance of outside air which may contain moisture
  - remove ozone from the magneto housing \*
  - allow heated air from the accessory compartment to keep the internal parts of the magneto dry.
2306. The difference between a low-tension and a high-tension engine ignition system is :
- a low-tension system produces relatively low voltage at the spark plug as compared to a high-tension system
  - a low-tension system does not require any high voltage ignition leads, but a high-tension system requires all leads to transmit high voltage
  - a high-tension system is designed for high-altitude aircraft, while a low-tension system is for low-to-medium altitude aircraft
  - a low-tension system uses a transformer coil near the spark plugs to boost voltage, while the high-tension system voltage is constant from the magneto to the spark plugs.\*
2307. The test instrument which could be used to test a high-tension ignition harness for suspected leakage is :
- a micro-ammeter \*      b. a d.c. voltmeter
  - an a.c. voltmeter      d. a d.c. ammeter.
2308. The capacitor-type ignition system is used almost universally on turbine engine because of its high voltage and
- low amperage
  - long life
  - low-temperature range
  - high-heat intensity.\*
2309. In a low-tension ignition system, each spark plug requires an individual
- condenser                      b. cam assembly
  - breaker assembly              d. secondary coil.\*
2310. If the spark plugs are gapped too wide, it would lead to
- Insulation failure      b. hard starting \*
  - shell breakdown      d. lead damage.
2311. When removing a shield spark plug, which of the following is most likely to be damaged ?
- center electrode      b. shell section
  - ground electrodes      d. core insulator.\*
2312. The effect of a cracked distributor rotor on a magneto would be
- ground the secondary circuit through the crack \*
  - fire the trailing cylinder
  - fire two cylinders simultaneously
  - ground the primary circuit through the crack..
2313. In a turbojet engine d.c. capacitor discharge ignition system, the high-voltage pulses are formed at
- the breaker
  - the triggering transformer \*
  - the rectifier
  - the multilobe cam.
2314. The breaker point characteristics associated with a faulty condenser is :
- oily                              b. crowned
  - fine grained                  d. coarse grained.\*
2315. Most radial engine spark plug wires are connected to the distributor block by
- use of cable-piercing screw \*
  - use of self-locking cable ferrules
  - use of terminal sleeves and retaining nuts
  - friction between the cable ferrule and distributor block well.
2316. Thermocouples are usually inserted or installed on the
- coldest cylinder of the engine
  - front cylinder of the engine
  - rear cylinder of the engine
  - hottest cylinder of the engine.\*
2317. In a high voltage d.c. capacitor input turbine engine ignition system, the contact points for the ignition system are closed by
- a magnetic force
  - spring action \*
  - cam action
  - high capacitance discharge.
2318. A radio noise filter in a turbine engine ignition system filters radio frequency noise pulses by
- reducing the voltage spikes
  - increasing the noise frequencies to a level that is compatible to the radio equipment \*
  - blocking radio frequency noise pulses and shunting them to ground
  - inducting voltage spikes.

2319. In a high-tension ignition system, a primary condenser of too low a capacity will cause
- excessive primary voltage
  - excessively high secondary voltage
  - the breaker contacts to burn \*
  - excessive burning of the spark plug electrodes.
2320. If an aircraft ignition switch is turned off and the engine continues to run normally, the trouble is probably caused by
- a leak in the carburetor
  - an open ground lead in the magneto \*
  - arcing magneto breaker points
  - failure to turn off the battery switch.
2321. The operating temperatures of a spark plug are controlled by :
- area of the plug exposed of the cooling airstream
  - rate of heat transfer of the engine seat gasket \*
  - area of the plug terminal
  - rate of heat inductance of the plug.
2322. If the secondary winding in a low-tension ignition coil fails it would result in
- one spark plug will fail to fire \*
  - all plugs will fail to fire
  - one row of plugs (front or rear) will fail to fire
  - one set (both plugs in one cylinder) will fail to fire.
2323. Hot spark plugs are generally used in aircraft powerplants
- with comparatively high compression
  - with comparatively low operating temperatures \*
  - which are loosely baffled
  - which produce high power per cubic inch displacement.
2324. If a spark plug lead becomes grounded, the
- magneto secondary winding will become overloaded and break down
  - magneto will not be affected \*
  - distributor rotor finger will discharge to the next closest electrode within the distributor
  - condenser will break down.
2325. Defective spark plugs will result in
- intermittent missing of the engine at high speeds only
  - intermittent missing of the engine at low speeds only
  - failure of the magneto
  - intermittent missing of the engine at all speeds.\*
2326. A spark plug is fouled when
- its gap is too small
  - its magneto wire is not connected
  - it causes preignition
  - its spark grounds without jumping electrodes.\*
2327. The cause for rejection of a spark plug would be :
- carbon fouling of the electrode and insulator
  - insulator tip cracked \*
  - center electrode being a light gray color
  - lead fouling of the electrode and insulator.
2328. The result of using too hot a spark plug would be
- failure of the engine
  - fouling of plug
  - pre-ignition \*
  - burned condenser.
2329. Upon inspection of spark plugs in an aircraft engine, the plugs were found caked with a heavy black soot. This means that
- worn oil seal rings
  - a rich mixture \*
  - a lean mixture
  - improper spark plug gap setting.
2330. Spark plug heat range is determined by
- the reach of the spark plug
  - its ability to transfer heat to the cylinder head \*
  - the number of ground electrodes
  - none of these.
2331. When a cold spark plug is used in a high-compression aircraft engine it would probably lead to
- normal operation \*
  - preignition
  - a fouled plug
  - detonation.
2332. Spark plug fouling cause by lead deposits occurs
- most often during cruise with rich mixture
  - most often when cylinder head temperatures are relatively low \*
  - most often when cylinder head temperatures are high
  - none of these.
2333. The spark occurs at the spark plug when the ignition's
- secondary circuit is broken
  - secondary circuit is completed
  - primary circuit is completed
  - primary circuit is broken.\*
2334. What type of ignition system is used on most jet aircraft engines ?
- high resistance
  - magneto
  - low tension
  - capacitor discharge.\*
2335. The high-tension ignition shielding tends to reduce radio interference because it
- prevents ignition flashover at high altitudes
  - protects the ignition leads against the entrance of moisture and subsequent electrical leakage
  - reduces voltage drop in the transmission of high-tension circuit
  - receives and grounds high-frequency waves coming from the magneto and high-tension ignition leads.\*

2336. The RPM at which a reciprocating engine ignition switch check made is :
- 1,500 RPM
  - the slowest possible RPM \*
  - full throttle RPM
  - cruise RPM.
2337. The secondary coil of a magneto is grounded through the
- ignition switch
  - grounded side of the primary condenser
  - primary coil \*
  - grounded side of the breaker points.
- CARBURETOR**
2338. If the water injection switch is turned on for a check of the carburetor derichment valve with the engine inoperative, it will lead to
- the valve will close because of water pump pressure
  - the valve will not actuate because of the absence of oil pressure \*
  - the valve will open by means of an electric solenoid mechanisms
  - the valve will close because of fuel boost pump pressure.
2339. A carburetor is equipped with a derichment valve and a derichment jet which adds a cooling fluid. This is termed as
- water evaporator additive
  - an injection of water and freon
  - atmosphere injection
  - ADI (anti-detonant injection).\*
2340. When the water injection system on a turbine engine airplane contains water and is armed in the cockpit, then
- the water is turned on automatically when a predetermined EGT is reached
  - the water injection system is turned on by a timer actuated by the power lever
  - the water injection valves are opened by a switch on their respective power levers in the cockpit \*
  - none of these.
2341. The anti-detonant fluid used in water injection systems is a mixture
- water and benzine
  - alcohol and water \*
  - potassium dichromate and water
  - none of these.
2342. If the water injection switch on a reciprocating engine is turned on when the engine is not operating, derichment valve will
- close because of water pressure
  - open by means of an electric solenoid
  - not actuate \*
  - none of these.
2343. The parameter which actuates the derichment valve in a pressure carburetor is :
- throttle linkage
  - air pressure
  - water (ADI) pressure \*
  - fuel pressure.
2344. The automatic fuel-flow metering mechanisms of most modern carburetors are actuated by the
- velocity of the air passing through the carburetor
  - velocity as well as the mass of air passing through the carburetor
  - mass of air passing through the carburetor \*
  - position of the throttle.
2345. The purpose of the economiser valve on a float type carburetor is :
- to economise on the amount of fuel discharged into the induction system
  - to provided extra fuel for sudden acceleration of the engine
  - to maintain the leanest mixture possible during cruising best power
  - to provide a richer mixture and fuel cooling at maximum power output.\*
2346. If the main air bleed of a float-type carburetor becomes clogged, the engine will run
- lean at rated power
  - rich at rated power \*
  - rich at idling
  - lean at idling.
2347. The method commonly uses to adjust the level of a float in a float-type carburetor is :
- lengthening or shortening the float shaft
  - add or remove shims under the needle valve seat\*
  - change the angle of the float arm pivot
  - add or remove flat weights.
2348. If an aircraft engine is equipped with a carburetor that is not compensated for altitude and temperature variations, the fuel/air mixture will become
- leaner as either the altitude or temperature increases
  - richer as the altitude increases and leaner as the temperature increases
  - richer as either the altitude or temperature increases.\*
  - leaner as either the altitude increases and richer as the temperature increases.
2349. When starting an aircraft engine equipped with carburetor heat, the heat control should be placed in
- the cold position \*
  - the hot position
  - between the hot and cold position
  - the warm filtered air position.



2350. When air passes through the venturi of a carburetor, three changes which would occur are :
- velocity increases, temperature increases, and pressure decreases
  - velocity decreases, temperature decreases, and pressure decreases
  - velocity decreases, temperature increases, and pressure increases
  - velocity increases, temperature decreases, and pressure decreases.\*
2351. An aircraft carburetor is equipped with a mixture control in order to prevent
- ice formation in the carburetor
  - the mixture from becoming too lean at high altitudes
  - the mixture from becoming too rich at high altitudes.\*
  - none of these.
2352. Which of the following is not a function of the carburetor venturi ?
- proportions the air/fuel mixture
  - decreases pressure at the discharge nozzle
  - regulates the idle system \*
  - limits the airflow at full throttle.
2353. The location of throttle valve of the float-type aircraft carburetors is :
- ahead of the venturi and main discharge nozzle
  - after the main discharge nozzle and ahead of the venturi
  - between the venturi and engine \*
  - none of these.
2354. Which device controls the volume of the fuel/air mixture to the cylinders ?
- an acceleration pump
  - a mixture control
  - a metering jet
  - a throttle valve.\*
2355. During the operation of an aircraft engine, the pressure drop in the carburetor venturi depends primarily upon the
- air temperature
  - barometric pressure
  - air velocity \*
  - none of these.
2356. An aircraft engine continuous cylinder fuel injection system normally discharges fuel into each cylinder head intake valve port. This happens during stroke (s)
- intake
  - compression
  - intake and compression
  - all (continuously).\*
2357. Which of the following components would probably require change ?
- venturi \*
  - float
  - throttle valve
  - needle-valve and seat assembly.
2358. On a carburetor without an automatic mixture control as you ascent on altitude, the mixture will
- be riched \*
  - be leaned
  - remain at the same ratio
  - not be affected.
2359. The type of fuel control used on most of today's turbine engines is :
- electromechanical
  - mechanical
  - hydromechanical \*
  - electronic.
2360. The conditions under which the trimming of a turbine engine will be most accurate are :
- low moisture and a tail wind
  - high wind and high moisture
  - high moisture and low wind
  - no wind and low moisture.\*
2361. When a new carburetor is installed on an engine it is necessary to
- warm up the engine and adjust the float level
  - not to adjust the idle mixture setting ; this was accomplished on the flow bench
  - the engine is warmed up to normal temperatures, adjust the idle mixture, then the idle speed \*
  - none of these.
2362. an excessively lean fuel/air mixture may lead to
- an increase in cylinder head temperature \*
  - high oil pressure
  - backfiring through the exhaust
  - an increase in engine power.
2363. A fuel/air mixture ratio of 11:1 is
- one part fuel to 11 parts air
  - too rich to burn
  - one part air to 11 parts fuel \*
  - none of these.
2364. The function of fuel crossfeed systems in aircraft is :
- to defuel tanks
  - to purge the fuel tanks
  - to jettison fuel in case of an emergency
  - to maintain air craft stability.\*
2365. A fuel pressure relief valve is required on
- a wobble pump
  - centrifugal fuel boost pump
  - an engine-driven fuel pump \*
  - a main fuel strainer.
2366. A rotary-vane pump is best describes as
- positive-displacement pump \*
  - a variable-displacement pump
  - a boost pump
  - an auxiliary pump.

2367. Fuel pressure produced by the engine-driven fuel pump is adjusted by the
- by pass valve adjusting screw
  - relief valve adjusting screw \*
  - main fuel strainer adjusting screw
  - engine-driven fuel pump adjusting screw.
2368. How do gasoline and kerosene used as turbine engine fuels. Compare in heat energy ?
- gasoline has more heat energy per gallon than kerosene
  - kerosene has more heat energy per gallon than gasoline \*
  - gasoline and kerosene have the same heat energy per unit of volume
  - gasoline and kerosene have the same heat energy per unit of weight.
2369. How often should float carburetors be over-hauled ?
- at engine overhaul \*
  - annually
  - after each 100 hours of operation
  - at engine change.
2370. The final authority for the details of carburetor overhaul is :
- the local FAA safety inspector
  - the type certificate data sheets for the engine
  - the manufacturer's recommendations \*
  - the AMFI text on aircraft carburetors.
2371. Which method is commonly used to prevent carburetor icing ?
- preheat the intake air \*
  - mix alcohol with the fuel
  - coat the butterfly valve with glycerine
  - use water.
2372. Maximum power is normally considered to be developed in reciprocating engine with an air-fuel mixture ratio of
- 8:1
  - 10:1
  - 12:1 \*
  - 15:1.
2373. Carburetor icing is most severe at
- air temperatures between 30° F and 40° F \*
  - high altitudes
  - low engine temperatures
  - air temperature below 0° F.
2374. The part of an aircraft in flight which will begin to accumulate ice before any other is :
- wing leading edge
  - propeller spinner or dome
  - nose or fuselage on multiengine aircraft
  - carburetor.\*
2375. An increase in manifold pressure takes place when carburetor heat is applied. This indicates
- excessive heat is being used
  - ice was forming is being used \*
  - ice was forming in the carburetor
  - mixture was too lean
  - overheating of cylinder heads.
2376. The purpose of the density controller in a turbocharger system is :
- to maintain constant air velocity at the carburetor venturi
  - to limit the maximum manifold pressure than can be produced at other than full throttle conditions
  - to limit the maximum manifold pressure that can be produced by the turbocharger at full throttle \*
  - none of these.
2377. The speed of a turbosupercharger is regulated by :
- turbine
  - compressor
  - waste gate \*
  - throttle.
2378. The purpose of a turbocharger system for a small reciprocating aircraft engine is :
- it compresses the air to hold the cabin pressure constant after the aircraft has reached its critical altitude
  - it maintains constant air velocity in the intake manifold
  - it compresses air to maintain manifold pressure constant from sea level to the critical altitude of the engine \*
  - it maintains variable air pressure to the carburetor venturi.
2379. When starting an engine equipped with a carburetor air heater, the position in which the heater should be placed is :
- hot
  - cold \*
  - halfway open
  - neutral.
2380. The application of carburetor heat during engine operation will
- decrease the weight of the fuel/air charge \*
  - decrease the volume of air in the cylinder
  - increase the volume of air in the cylinder
  - increase the density of air in the cylinder.
2381. On an aircraft that utilizes an exhaust heat exchanger as a source of cabin heat, how should the exhaust system be inspected ?
- x-rayed to detect any cracks
  - tested by use of an exhaust gas analyzer
  - hydrostatically tested
  - with the heater air shroud removed.\*

2382. Corrosion-resistant steel parts such as exhaust collector are cleaned using
- steel grit which has not previously been used on soft iron
  - super fine granite grit
  - sand which has not previously been used on iron or steel \*
  - soft iron chill which has not previously been used on hardened steel.
2383. Power recovery turbines used on some reciprocating engines are driven by the
- exhaust gas pressure
  - crankshaft
  - velocity of the exhaust gases \*
  - fluid drive coupling.
- PROPELLERS**
2384. Aircraft electrical power for propeller deicer system is transferred from the engine to the propeller hub assembly by
- slip rings and segment plates
  - slip rings and brushes \*
  - collector ring and transducer
  - flexible electrical connectors.
2385. Anti-icing fluid is rejected from the singer ring on a propeller by
- ejector valves
  - pump pressure
  - centripetal force
  - centrifugal force.\*
2386. Propeller fluid anti-icing systems generally use
- ethylene glycol
  - isopropyl alcohol \*
  - denatured alcohol
  - ethyl alcohol.
2387. The most common fluid used for propeller ant-icing on a reciprocating engine aircraft is :
- ethylene glycol
  - isopropyl alcohol \*
  - denatured alcohol
  - phosphate compounds.
2388. One of the functions of the automatic propeller synchronising system on multiengine aircraft is :
- to increase vibration and reduce noise
  - to control the tip speed of all propellers
  - to control engine RPM and reduce vibration \*
  - to control the power output of all engines.
2389. Ice formation on propellers when the aircraft is in flight, will
- decrease thrust and cause excessive vibration \*
  - increase stall speed and increase noise
  - decrease stall speed and increase noise
  - increase thrust and cause excessive vibration.
2390. The purpose of an arbor used in balancing a propeller is :
- to support the propeller on the balance knives \*
  - to level the balance stand
  - to indicate the weight to be added or removed
  - to mark the propeller blades where weights are to be attached.
2391. If a blade of a particular metal propeller is shortened because of damage to the tip, the remaining blade(s) must be
- round down at the shank to balance the weight
  - reset (blade angle) to compensate for the shortened blade
  - returned to the manufacturer for alternation
  - reduced to conform with the shortened blade.\*
2392. Consider a powerplant using a hydraulically controlled constant-speed propeller and operating within the propeller's constant speed range at a fixed throttle setting. If the tension of the propeller governor control spring (speeder spring) is reduced by movement of the cockpit propeller control, the propeller blade angle will
- increase, engine manifold pressure will increase, and engine RPM will decrease \*
  - decrease, engine manifold pressure will increase, and engine RPM will decrease
  - decrease, engine manifold pressure will decrease, and engine RPM will increase
  - none of these.
2393. When engine power is increased, the constant speed propeller will
- maintain the RPM, decrease the blade angle, and maintain a low angle of attack
  - increase the RPM, decrease the blade angle, and maintain a low angle of attack
  - maintain the RPM, increase the blade angle, and maintain a low angle of attack \*
  - increase the RPM, increase the blade angle, and maintain a high angle of attack.
2394. The speed of a hydromatic constant- speed propeller is changed in flight by
- varying the output of the governor booster pump
  - advancing the throttle to a higher manifold pressure
  - changing the rotational speed of the pilot valve in the governor
  - changing the load tension against the flyweights in the governor.\*
2395. The operational force which causes the greatest stress on a propeller is
- aerodynamic twisting force
  - centrifugal force \*
  - thrust bending force
  - torque bending force.

2396. The operational force which tends to increase propeller blade angle is :
- centrifugal twisting force
  - aerodynamic twisting force \*
  - thrust bending force
  - torque bending force.
2397. A propeller is controlled in a large aircraft with the turboprop installation
- independently of the engine
  - by varying the engine RPM except for feathering and reversing
  - by varying the gear ratio between the propeller and the engine
  - by the engine power lever.\*
2398. The effect of the aerodynamic twisting force operating propeller blades is :
- it tends to band the blades opposite the direction of rotation
  - it tends to turn the blades to a high blade angle \*
  - it tends to bend the blades forward
  - it tends to turn the blades to a low blade angle.
2399. Propellers exposed to salt spray should be cleaned with
- a caustic solution
  - steel wool
  - fresh water \*
  - soapy water.
2400. A steel propeller hub is tested for cracks by
- anodising
  - magnafluxing \*
  - electrotesting
  - etching.
2401. Which of the following propeller blade areas, repairs of aluminum alloy adjustable pitch propellers are not permitted to be made ?
- Shank \*
  - Leading edge
  - Tip
  - Trailing edge.
2402. The function which requires the use of a propeller blade station is :
- measuring blade angle \*
  - installation and removal of propeller
  - indexing blades
  - propeller balancing.
2403. The actual distance a propeller moves forward through the air during one revolution is called
- effective pitch \*
  - geometric pitch
  - relative pitch
  - resultant pitch.
2404. Propeller blade stations are measured form the
- index mark on the blade shank
  - hub centerline \*
  - blade base
  - blade tip.
2405. The thrust produced by a rotating propeller is due to
- propeller slippage
  - an area of low pressure behind the propeller blades
  - an area of decrease pressure immediately in front of the propeller blades \*
  - the angle of relative wind and the rotational velocity of the propeller.
2406. The CTM (centrifugal twisting moment) of an operating propeller tends to
- increase the pitch angle
  - reduce the pitch angle \*
  - bend the blades in the direction of rotation
  - bend the blades rearward in the line of flight.
2407. The holding coil on a hydromatic propeller feathering button switch holds a solenoid relay closed that applies power to the propeller
- governor
  - synchroniser
  - dome feathering mechanism
  - feathering motor pump.\*
2408. the aerodynamic force acting on a rotating propeller blade operating at a normal pitch angle tends to
- reduce the pitch angle
  - increase the pitch angle \*
  - bend the blades rearward in the line of flight
  - bend the blades in the direction of rotation.
2409. The blade angle of a fixed-pitch propeller is
- greatest at the tip
  - constant from the hub to the tip
  - smallest at the tip \*
  - none of these.
2410. The centrifugal load of the rotating blades of a counterweight or hydromatic propeller is transferred to the
- barrel \*
  - spider
  - thrust washer
  - barrel support assembly.
2411. Major repairs to aluminum alloy propellers and blades may be done by
- powerplant mechanic working for certificated A & P mechanic
  - any propeller manufacturer
  - an appropriately rate repair station or the manufacturer \*
  - a repairman, regardless of where he/she works.
2412. Geometric pitch of a propeller is defined as the
- effective pitch minus slippage
  - effective pitch plus slippage \*
  - angle between the blade chord and the plane of rotation
  - angle between the blade face and the plane of rotation.

2413. Propeller blade angle is defines as the angle between the
- chord of the blade and the relative wind
  - relative wind and the rotational plane of the propeller
  - chord of the blade and the rotational plane of he propeller \*
  - geometric pitch and the effective pitch.
2414. The operational force which causes propeller blade tips to lag in the opposite direction of rotation is :
- thrust-bending force
  - aerodynamic-twisting force
  - centrifugal-twisting force
  - torque-bending force.\*
2415. The operational force which tends to bend the propeller blades forward at the tip is :
- torque-ending force
  - aerodynamic-twisting force
  - centrifugal-twisting force
  - thrust-bending force.\*
2416. The rotational speed and blade pitch angle requirements of a constant-speed propeller during takeoff are :
- low-speed and low-pitch angle
  - low-speed and high-pitch angle
  - high-speed and low-pitch angle \*
  - high-speed and high-pitch angle.
2417. Holes are drilled in the metal tips of fixed-pitch wood propellers to
- decrease the weight of the propeller
  - minimise splitting long the grain of the wood
  - balance the propeller
  - equalize the moisture content within the blades.\*
2418. What is the primary purpose of the front and rear cones for propellers that are installed on splined shafts ?
- to position the propellers that are installed on splined shaft \*
  - to prevent metal-to-metal contact between the propeller and the splined shaft
  - to reduce stresses between the splines of the propeller an the splines of the shaft
  - none of these.
2419. Propeller blade tracking is the process of estimating
- the plane of rotation of the propeller with respect to the aircraft longitudinal axis
  - that each blade will have and same angle of attack of prevent vibration
  - that the blade angles are within the specified tolerance of each other
  - the positions of the tips of the propeller blades relative to each other.\*
2420. The position in which the constant speed propeller control is placed to check the magnetos is ;
- full decrease, low propeller blade pitch angle
  - full increase, high propeller blade pitch angle
  - full increase, low propeller blade pitch angle \*
  - full decrease, high propeller blade pitch angle.
2421. The propeller-feathering pump is shut off
- 15 seconds after depressing the feather button switch
  - by a micros witch in the propeller governor
  - by a oil pressure switch \*
  - none of these.
2422. The correct way to connect a test voltmeter in a circuit is
- between source voltage and the load
  - to place one lead on either side of the fuse
  - in series with a unit
  - in parallel with a unit.\*
2423. Which of the following electrical measuring instruments is most likely to obtain its own source of electrical power ?
- Wattmeter
  - Ohmmeter \*
  - Ammeter
  - Voltmeter.
2424. In figure shown below the unit is located immediately downstream of the expansion valve in a freon refrigeration system is :
- condenser
  - cooling turbine
  - compressor
  - evaporator coils.\*
2425. The purpose of the pump crossfeed valve in the figure shown is :
- to balance the fuel in the tanks
  - to allow operation of both engines \*
  - to allow operation of engine from tank
  - none of these.
2426. If the modulus of elasticity is equal to zero, the material is said to be
- rigid
  - plastic \*
  - flexible
  - plastic
  - malleable
2427. Materials which fracture when the strains are small are known as
- brittle \*
  - ductile
  - rigid
  - plastic
  - flexible
2428. Which is the softest out of the following
- ferrite \*
  - austenite
  - cementite
  - pearlite
  - bainite

2429. Weld decay is a phenomenon associated with  
 a. nonferrous materials    b. mild steel  
 c. cast iron                    d. high control steel  
 e. stainless steel \*
2430. With increase in temperature of a material, its  
 a. strength and ductility increase  
 b. strength and ductility decrease  
 c. strength decreases but ductility increases \*  
 d. strength increases but ductility decreases  
 e. none of the above
2431. The unit of Brinell hardness number is  
 a. kilogram-millimetre  
 b. kilogram per millimetre  
 c. kilogram millimetre square  
 d. kilogram per square millimetre \*  
 e. a dimensionless quantity
2432. Soft magnetic materials have  
 a. low hysteresis and low eddy current \*  
 b. high hysteresis and high eddy current  
 c. low hysteresis and high eddy current  
 d. high hysteresis and low eddy current  
 e. none of the above is correct
2433. If the temperature of an intrinsic semi-conductor is raised to sufficiently high value, it may behave as  
 a. conductor \*                    b. insulator  
 c. semi-conductor                d. super-conductor  
 e. unchanged
2434. The percentage of iron in pig iron is  
 a. 85%                                b. 90% \*  
 c. 92.5%                              d. 95%  
 e. 97%
2435. Permanent set in a material is produced by  
 a. subjected it to fatigue loading  
 b. subjecting it to high temperature  
 c. triaxial loading  
 d. stressing it beyond the elastic limit \*  
 e. applying compressive and tensile loads simultaneously
2436. Toughness is that property of a material which enables it to absorb energy at high stress without fracture, usually above the elastic limit. Which of the following material has high toughness  
 a. cast iron                            b. wrought iron \*  
 c. carbon steel                        d. stainless steel  
 e. aluminium alloys
2437. Electrolytic reduction of alumina is done by  
 a. Pattinson's process  
 b. Bayer's process  
 c. Hall and Heroult process  
 d. Hoop's process \*  
 e. Duplex process
2438. A fertile material is one which can be  
 a. converted into fissile material on absorption of neutrons \*  
 b. fissioned by slow (thermal) neutrons  
 c. fissioned by fast neutrons  
 d. fissioned by either slow or fast neutrons  
 e. converted into fissile material by emission of neutrons
2439. Hastelloy comprises  
 a. copper and nickel  
 b. copper and aluminium  
 c. molybdenum and nickel \*  
 d. lead and tin  
 e. molybdenum and copper
2440. A particular coal is said to be free burning when it  
 a. burns completely  
 b. gives smokeless burning  
 c. shows little or no fusing action \*  
 d. can be ignited without auxiliary energy  
 e. leaves no unburnt carbon
2441. Plastic tubes and pipes are generally made by  
 a. injection moulding  
 b. extrusion moulding \*  
 c. transfer moulding  
 d. compression moulding  
 e. all of the above
2442. Slag inclusion in castings is a  
 a. superficial defect  
 b. internal defect  
 c. moulding defect  
 d. defect that can be removed by fettling  
 e. surface defect \*
2443. Charpy test is  
 a. a bending test                    b. an impact test \*  
 c. a fatigue test                      d. a hardness test  
 e. an endurance test
2444. Which of the following stainless steels is nonmagnetic ?  
 a. ferreted                              b. martensitic  
 c. austenitic                            d. all of the above  
 e. none of the above \*
2445. Presence of cobalt in steel improves its  
 a. cutting ability \*                    b. corrosion resistance  
 c. tensile strength                    d. creep properties  
 e. fatigue properties
2446. Gun metal is an alloy of  
 a. nickel, tin and copper  
 b. copper, tin and zinc \*  
 c. copper, phosphorous and nickel  
 d. manganese, phosphorous and nickel  
 e. copper, zinc and phosphorous

2447. Which of the following parts need not be subjected to carburising treatment
- gears
  - cams
  - piston gears
  - ingot \*
  - gudgeon pin
2448. Which of the following processes is commonly used for hardening of gear tooth
- cold working
  - quenching
  - dispersion hardening
  - induction hardening \*
  - forging
2449. Duralumin alloy essentially contains copper and
- zinc
  - tin
  - aluminium \*
  - lead
  - iron
2450. In brass, copper is alloyed with
- tin
  - zinc \*
  - aluminium
  - lead
  - nickel
2451. Alloy of copper and tin is called
- brass
  - bronze \*
  - duralumin
  - gun metal
  - babbit metal
2452. Monel metal is an alloy of copper and
- tin
  - zinc
  - aluminium
  - nickel \*
  - lead
2453. In transformer steel, the element which provides the required property is
- manganese
  - nickel
  - silicon \*
  - chromium
  - cobalt
2454. Incol is an alloy of
- nickel-chromium-iron \*
  - nickel-copper-iron
  - copper-zinc-iron
  - nickel-molybdenum-iron
  - nickel-chromium and molybdenum
2455. Pudding process is employed for converting
- pig iron into cast iron
  - mild steel into alloy steel
  - pig iron into wrought iron \*
  - cast iron into mild steel
  - pig iron into desired steel
2456. Pig iron may be called basic or acid, depending upon its
- phosphorous content \*
  - sulphur content
  - silicon content
  - slag content
  - manganese content
2457. The component that influences the fluidity of molten iron most is
- silicon
  - manganese
  - sulphur
  - phosphorous \*
  - lead
2458. The sizing of the particles may be achieved by
- crushing
  - grinding
  - screening \*
  - electrostatic separator
  - milling
2459. Grizzly is used for
- crushing
  - grinding
  - screening \*
  - electrostatic separation
  - precipitation
2460. In tempering of alloy steels, the hardness rises to peak value, following by a gradual drop. This phenomenon is known as
- auto-tempering
  - age-hardening
  - secondary-hardening \*
  - precipitation-hardening
  - austempering
2461. Temper brittleness may be fairly detected by
- tensile test
  - fatigue test
  - creep test
  - notched bar impact test \*
  - hardness test
2462. Which of the following heat-treatment is applied to steel castings
- sub-critical annealing
  - full-annealing \*
  - normalising
  - quenching
  - tempering
2463. Dielectric materials are
- conductors
  - semiconductors
  - insulators \*
  - superconductors
  - transistors
2464. The binding material in diamond tools is
- cobalt
  - graphite
  - carbon
  - a sort of adhesive chemical
  - none of the above \*
2465. Tensile strength of structural steel St 50 is of the order of
- 50-60 N/m<sup>2</sup>
  - 50-60 N/cm<sup>2</sup>
  - 500-600 kg/cm<sup>2</sup>
  - 500-600 kg/mm<sup>2</sup>
  - 500-600 N/mm<sup>2</sup> \*

2466. If both the mean diameter and spring wire diameter of the spring be increased twice then the deflection of spring will
- remain same
  - increase twice
  - be halved \*
  - increase four times
  - be reduced four times
2467. Young's modulus is a measure of the following property of a material
- tensile strength
  - ductility
  - malleability
  - stiffness \*
  - creep resistance
2468. Whether a given material is brittle or ductile can be tested by
- hardness test
  - impact test \*
  - bend test
  - cupping test
  - tensile test
2469. The results of an impact test are reported
- in terms of height of hammer
  - as deformation around the notch on specimen
  - as weight of hammer
  - in terms of impact numbers
  - in joules \*
2470. If both the modulus of elasticity and the shearing modulus of a metal are doubled, the Poisson's ratio of metal will
- get doubled
  - become four times
  - get halved
  - become one fourth
  - remain unaffected \*
2471. If the length of a member and its area of cross-section are doubled, then its deflection under load P will
- get doubled
  - become four times
  - get halved
  - become one fourth
  - remain unaffected \*
2472. Fig. 10.10 shows the stress-strain diagrams for a specimen of soft steel. Curve in dotted line is for
- unit stress
  - apparent unit stress
  - actual unit stress \*
  - log of unit stress
  - not possible

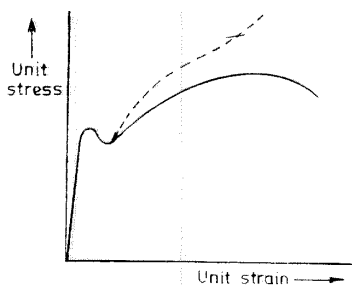


Fig.10.10.

2473. Pick up the wrong statement about properties of materials
- Stiffness is that property of a material which enables it to absorb energy at high stress without fracture, usually above the elastic limit \*
  - Malleability is that property of a material that enables it to undergo great change in shape without rupture under compressive stress
  - Hardness is the ability of a material to resist indentation or abrasion
  - Resilience is that property of material which enables it to absorb, without being permanently deformed, the energy produced by the impact of a suddenly applied load or below
  - Ductility is that property of a material that enables it to be drawn permanently through great change of shape without rupture
2474. For drilling deep holes of small diameter by electrical discharge machining the tool is made of
- brass wire
  - copper wire
  - graphite wire
  - tungsten wire \*
  - H.S.S.
2475. The language with which a computer works directly
- ALGOL
  - FORTRAN
  - COBOL
  - compiler
  - machine language \*
2476. Modulus of toughness refers to the area under a stress-strain curve upto the
- elasticity limit
  - yield strength
  - proportional limit
  - maximum point
  - entire area \*
2477. For ductile materials, the most suitable theory of failure applicable is
- maximum principle stress theory
  - maximum shearing stress theory
  - maximum principle strain theory
  - maximum energy of distortion theory \*
  - all of the above
2478. Which of the following is not concerned with determination of stress in materials
- Strain gauge
  - Photoelastic model method
  - Moire's method
  - Fibre optic technique \*
  - X-ray diffraction
2479. Pipe joints which rely on pressure are called
- compression joints \*
  - tension joints
  - manipulative joints
  - capillary joints
  - solvent welded joints



2480. Nonmetallic materials used to withstand high temperatures are called refractories. Alumina brick is a
- silica refractory
  - basic refractory
  - neutral refractory \*
  - special refractory
  - none of the above
2481. Which of the following refractory material has highest melting temperature and excellent strength at high temperature
- alumina
  - dolomite
  - quartz
  - zirconia
  - magnesite \*
2482. Ceramics are finding more and use in electronics. Pick out false statement about characteristics of various electronic ceramics
- Cordierite has a very low thermal expansion and can be used where thermal shock is a problem
  - Zircon is used where chemical attack may be expected
  - Alumina has excellent dielectric properties and great strength
  - Stealites are used where dry pressing is the only process economically feasible, but low absorptions and high strengths must be maintained
  - Beryllia has poor dielectric strength but high thermal conductivity \*
2483. Plasticisers are generally
- liquids that impart flexibility, softness, and ease of processing to a resin \*
  - materials used to prevent or minimise degradative effects induced by heat, ultraviolet light, ozone, etc.
  - inert solids added to resin to enhance properties and/or to reduce the cost
  - dyes used to enhance appeal
  - release agents which aid the processing of plastics during milling, extrusion, calendaring, etc.
2484. The following is a generic name for any longchain polyamide, derived from the condensation of a diamine with a dicarboxylic acid
- nylon \*
  - polyimides
  - acrylics
  - epoxy resin
  - phenolics
2485. Solar cells have been made from
- flat metallic blue chips made of highly pure silicon
  - polycrystalline silicon wafers
  - amorphous silicon films
  - monocrystalline wafer of high purity silicon
  - all of the above \*
2486. The elasticity is the property of a material which enables it to
- regain its original shape after deformation when the external forces are removed. \*
  - draw into wires by the application of a tensile force.
  - resist fracture due to high impact loads.
  - retain deformation produced under load permanently.
2487. When carbon in the cast iron is principally in the form of graphite, the cast iron will be of
- grey colour \*
  - white colour
  - yellow colour
  - brown colour
2488. When carbon in the cast iron is in the form of cementite, the cast iron will be of white colour.
- Correct \*
  - Incorrect
2489. The steel widely used for car crankshafts is
- nickel steel
  - chrome steel \*
  - nickel chrome steel
  - high speed steel
2490. A steel containing 0.8% carbon is known as
- eutectoid steel \*
  - hyper-eutectoid steel
  - hypo-eutectoid steel
  - none of these
2491. A steel containing ..... 0.8% carbon is known as hypo-eutectoid steel.
- equal to
  - less than \*
  - greater than
2492. A steel containing more than 0.8% carbon is known as eutectoid steel.
- Yes
  - No \*
2493. For hardening alloy steel and high speed steels, they are heated to
- 500 to 600° C
  - 700 to 900° C
  - 1100 to 1300° C \*
  - 1300 to 1500° C
2494. In order to remove internal stresses produced by hardening the steel, the process usually adopted is
- tempering \*
  - annealing
  - normalising
  - spheroidising
2495. The process which improves the machinability of steels, but lowers the hardness and tensile strength is
- normalising
  - full annealing
  - normalising
  - spheroidising \*
2496. The temperature required for full annealing in hyper-eutectoid steel is
- 50° C above upper critical temperature \*
  - 50° C below upper critical temperature
  - 50° C above lower critical temperature
  - 50° C below lower critical temperature

2497. When percentage of carbon in steel is increased, the ductility of steel decreases.  
a. Right \*                                          b. Wrong
2498. The temperature at which the new grains are formed in the metal is known as  
a. lower critical temperature  
b. upper critical temperature  
c. recrystallisation temperature \*  
d. none of these
2499. The working of metals above the recrystallisation temperature is known as hot working.  
a. True \*                                          b. False
2500. When a metal or alloy is cold worked,  
a. it is worked below room temperature  
b. its hardness and strength increases \*  
c. it is worked below recrystallisation temperature  
d. none of the above
2501. During hot working of metals,  
a. porosity of the metal is largely eliminated  
b. grain structure of the metal is refined  
c. mechanical properties are improved due of refinement of grains  
d. all of the above \*
2502. The cold working of metals is carried out ..... the recrystallisation temperature.  
a. above                                          b. below \*
2503. The process extensively used for making bolts and nuts is  
a. hot piercing                                          b. extrusion  
c. cold peening                                          d. cold heading \*
2504. The modulus of elasticity for mild steel is approximately equal to  
a. 80 kN/mm<sup>2</sup>                                          b. 100 kN/mm<sup>2</sup>  
c. 110 kN/mm<sup>2</sup>                                          d. 210 kN/mm<sup>2</sup> \*
2505. The ratio of the ultimate stress to the design stress is known as  
a. elastic limit                                          b. strain  
c. factor of safety \*                                          d. bulk modulus
2506. Which of the following is not a thermoset material  
a. phenolic resin  
b. formaldehyde  
c. bakelite  
d. nylon \*  
e. epoxy resin
2507. Which of the following is not thermoplastic material  
a. polyethylene  
b. polyvinyl chloride  
c. polystyrene  
d. polypropylene  
e. phenolic resin \*
2508. Which of the following moulding process is not concerned with moulding of thermoplastics  
a. compression moulding \*  
b. extrusion  
c. injection moulding  
d. calendaring  
e. blow moulding
2509. Graphite is used as a filler metal in thermosets for  
a. reducing amount of resin and improving mechanical properties  
b. improving impact strength  
c. increasing electric resistance  
d. lowering surface friction \*  
e. giving better resistance to heat and acid attack
2510. The compression members tend to buckle  
a. at centre  
b. at upper portion  
c. at lower portion  
d. in the direction of least radius of gyration \*  
e. at the least cross sectional area
2511. Band in computer terminology is  
a. measure of transmission speed \*  
b. number of bits a computer can handle at a time  
c. capacity of computer main memory  
d. number of different characters that can be encoded  
e. none of the above
2512. The difference between the upper limit and lower limit of a dimension is called  
a. nominal size                                          b. basic size  
c. actual size                                          d. tolerance \*
2513. The algebraic difference between the maximum limit and basic size is called  
a. lower deviation  
b. upper deviation \*  
c. actual deviation  
d. mean deviation
2514. The lower deviation is the algebraic difference between the  
a. minimum limit and the basic size \*  
b. maximum limit and the basic size  
c. actual size and the corresponding basic size  
d. none of the above
2515. The algebraic difference between the actual size and the corresponding basic size is called actual deviation  
a. Agree \*                                          b. Disagree
2516. In unilateral system of tolerance, the tolerance is allowed on  
a. one side of the actual size  
b. one side of the nominal size \*  
c. both sides of the actual size  
d. both sides of the nominal size

2517. A basic shaft is one whose  
 a. lower deviation is zero  
 b. upper deviation is zero.\*  
 c. lower and upper deviations are zero  
 d. none of these
2518. A basic hole is one whose  
 a. lower deviation is zero \*  
 b. upper deviation is zero.  
 c. lower and upper deviations are zero  
 d. none of these
2519. When a hole of diameter 'd' is punched in a metal of thickness 't', then the force required to punch a hole is equal to  
 a.  $d.t.\tau_u$                       b.  $\pi d.t.\tau_u$  \*  
 c.  $\frac{\pi}{4} \times d^2 \tau_u$                       d.  $\frac{\pi}{4} \times d^2 \times t \tau_u$
- where  $\tau_u$  = Ultimate shear strength of the material of the plate.
2520. An aluminium member is designed on the basis of  
 a. yield stress \*  
 b. elastic limit stress  
 c. proof stress  
 d. ultimate stress
2521. A localised compressive stress at the area of contact between two members is known as  
 a. tensile stress                      b. bending stress  
 c. bearing stress \*                      d. shear stress
2522. The stress in the bar when the load is applied suddenly is ..... as compared to the stress induced due to gradually applied loads.  
 a. same                                      b. double \*  
 c. three times                              d. four times
2523. The shear modulus of resilience is proportional to  
 a. shear stress  
 b. (shear stress)<sup>2</sup> \*  
 c. (shear stress)<sup>3</sup>  
 d. (shear stress)<sup>4</sup>
2524. An elastic bar is fixed at the upper end and loaded at the lower end by a falling weight. The shock load produced can be reduced by  
 a. increasing the length of bar  
 b. decreasing the cross-sectional area of the bar  
 c. decreasing the modulus of elasticity of the bar  
 d. all of the above \*
2525. When a load W is suddenly applied to a bar of weight  $W_1$ , the stress induced in the bar will increase with the increase in weight  $W_1$ .  
 a. Right  
 b. Wrong \*
2526. Two shaft A and B under pure torsion are of identical length and identical weight and are made of the same material. The shaft A is solid and the shaft B is hollow. We can say that  
 a. shaft B is better than shaft A \*  
 b. shaft A is better than shaft B  
 c. both the shafts are equally good
2527. The endurance or fatigue limit is defined as the maximum value of the stress which a polished standard specimen can withstand without failure, for infinite number of cycles, when subjected to  
 a. static load  
 b. dynamic load  
 c. static as well as dynamic load  
 d. completely reversed load \*
2528. Failure of material is called fatigue when it fails  
 a. at the elastic limit  
 b. below the elastic limit  
 c. at the yield point  
 d. below the yield point \*
2529. The resistance to fatigue of a material is measured by  
 a. elastic limit                              b. Young's modulus  
 c. ultimate tensile strength              d. endurance limit \*
2530. The yield point in static loading is ..... as compared to fatigue loading.  
 a. higher \*                                      b. lower  
 c. same
2531. Factor of safety for fatigue loading is the ratio of  
 a. elastic limit to the working stress  
 b. elastic limit to the yield point  
 c. endurance limit to the working stress \*  
 d. Young's modulus to the ultimate tensile strength
2532. The endurance limit for a mirror polished material will be ..... as compared to unpolished material.  
 a. same  
 b. less  
 c. more \*
2533. If the size of a standard specimen for a fatigue testing machine is increased, the endurance limit for the material will  
 a. have same value as that of standard specimen  
 b. increase  
 c. decrease \*
2534. The surface finish factor for a mirror polished material is  
 a. 0.45                                      b. 0.65  
 c. 0.85                                      d. 1 \*
2535. The fatigue limit of a material is greatly decreased by poor surface conditions.  
 a. Agree \*                                      b. Disagree

2536. Stress concentration is caused due to
- variations in load acting on a member
  - variations in properties of materials in a member
  - abrupt change of cross-section \*
  - all of these
2537. Stress concentration is caused due to
- maximum stress to the endurance limit
  - nominal stress to the endurance limit
  - maximum stress to the nominal stress \*
  - nominal stress to the maximum stress
2538. The value of stress concentration factor depends upon
- material of the part
  - geometry of the part
  - material and geometry of the part \*
  - none of these
2539. In static loading, stress concentration is more serious in
- brittle materials \*
  - ductile materials
  - brittle as well as ductile materials
  - elastic materials
2540. In cyclic loading, stress concentration is more serious in
- brittle materials
  - ductile materials \*
  - brittle as well as ductile materials
  - elastic materials
2541. Slag inclusion in castings is a
- superficial defect
  - internal defect
  - moulding defect
  - defect that can be removed by fettling
  - surface defect \*
2542. The propulsion output of aircraft is proportional to
- relative aircraft speed (free-stream velocity)  $v$
  - $v^2$
  - $v^3$  \*
  - $v^{3/2}$
  - $\sqrt{v}$
2543. A shaft is a rotating machine element.
- Correct \*
  - Incorrect
2544. A transmission shaft includes
- counter shaft
  - line shaft
  - over head shaft
  - all of these \*
2545. A crankshaft is a ..... shaft
- transmission
  - machine \*
2546. Two shafts of the same length and material are joined in series. If the ratio of their diameters is 2, then the ratio of their angles of twist will be
- 2
  - 4
  - 8
  - 16 \*
2547. A key is normally made from a cold rolled mild steel bars.
- Right \*
  - Wrong
2548. The V-belt is used to transmit great amount of power and when the two pulleys are very near to each other.
- Correct \*
  - Incorrect
2549. Wire ropes as compared to cotton ropes
- are lighter in weight
  - offer silent operation
  - can withstand shock loads
  - all of these \*
2550. The wire ropes make contact at
- bottom of groove of the pulley \*
  - sides of groove of the pulley
  - sides and bottom of groove of the pulley
  - anywhere in the groove of the pulley
2551. When compared to the rod of the same diameter and material, a wire rope
- is less flexible
  - has a much smaller load carrying capacity \*
  - does not provide much warning before failure
  - provides much greater time for remedial action before failure
2552. The effective stress in wire ropes during normal working is equal to the stress due to
- axial load plus stress due to bending \*
  - acceleration / retardation of masses plus stress due to bending
  - axial load plus stress due to acceleration / retardation
  - bending plus stress due to acceleration / retardation
2553. Which one of the following is a positive drive ?
- Crossed flat belt drive
  - Rope drive
  - V-belt drive
  - Chain drive \*
2554. In order to have smooth operation, the minimum number of teeth on the smaller sprocket, for moderate speeds, should be
- 15
  - 17 \*
  - 21
  - 25
2555. The speed of the sprocket reduces as the chain pitch ..... for a given number of teeth.
- increases \*
  - decreases
2556. The Wahl's stress factor ( $K$ ) for springs is given by
- $\frac{2C+1}{2C-1} + \frac{0.615}{C}$  \*
  - $\frac{2C-1}{2C+1} + \frac{0.615}{C}$
  - $\frac{4C+1}{4C-4} + \frac{0.615}{C}$
  - $\frac{4C-1}{4C-4} + \frac{0.615}{C}$
- where  $c$  = spring index  $\frac{\text{Mean dia. of spring}}{\text{Dia. of Wire}}$

2557. Which of the following is not a heat treatment process
- austempering
  - martempering
  - parkerizing
  - cyaniding
  - tempering \*
2558. S-curve is connected with
- combustion
  - cutting tools
  - corrosion
  - heat treatment \*
  - forging
2559. Sands are graded according to their
- source of origin
  - strength
  - permeability
  - clay content and grain size \*
  - moisture
2560. In sand moulding the bottom most part of the flask is called
- cope
  - cheek
  - drag \*
  - flask bottom
  - none of the above
2561. Cow dung is sometimes used in
- bench moulding
  - dry sand moulding
  - green sand moulding \*
  - all of the above
  - none of the above
2562. Moulding sands can contain following percentage of maximum quantity of moisture
- 2.5%
  - 5%
  - 8% \*
  - 12%
  - 20%
2563. Gas generated in mould made with synthetic sand as compared to silica sand is
- more
  - less \*
  - same
  - unpredictable
  - none of the above
2564. Riddle is
- a round sieve \*
  - a long, flat metal plate fitted with an offset handle
  - used to make or repair corners in a mould
  - used to scoop sand deep in the mould
  - none of the above
2565. In sand moulding, the middle part of flask is called
- cope
  - cheek \*
  - drag
  - flask-middle
  - none of the above
2566. Cope in foundry practice refers to
- bottom half of moulding box
  - top half of moulding box \*
  - middle portion of the moulding box
  - coating on the mould face
  - heavy weight kept on moulding box to overcome buoyant effect of molten metal
2567. In order to ram the sand softer on the pattern face and harder at the back of the mould, following type of moulding machine is used
- jolt
  - sand slinger
  - squeezing \*
  - stripper plate
  - diaphragm moulding
2568. Uniform sand hardness is obtained throughout the mould by following moulding machine
- jolt
  - sand slinger
  - squeezing
  - stripper plate
  - diaphragm moulding \*
2569. The purpose of chaplets is
- just like chills to ensure directional solidification
  - to provide efficient venting
  - to support the cores \*
  - to join lower and upper parts of the moulding box
  - compress moulding sand
2570. Which of the following is not a casting defect
- hot tear
  - blow hole
  - scab
  - decarburisation \*
  - shift
2571. Chills are metal inserts of steel that are placed at appropriate locations in the mould walls to
- decrease the freezing rate
  - increase the freezing rate
  - help directional solidification \*
  - prevent directional solidification
  - help progressive solidification
2572. Fluidity is greatly influenced by
- carbon content of molten metal
  - melting temperature of molten metal
  - inoculant addition
  - pouring temperature of molten metal \*
  - finish of the mould
2573. The chief advantage of die casting is
- possibility of incorporating thick sections on small castings
  - casting of inserts is possible
  - wide tolerances are possible
  - high production rates are possible \*
  - any material can be die cast easily
2574. The purpose of inoculation is
- to clean the casting
  - to decrease the melting temperature of a cast metal
  - to alter the chemical composition of a cast metal
  - to modify the structure and properties of a cast metal \*
  - to improve the finish of the castings

2575. The main advantage of steel moulding is that
- a metallic pattern is used
  - the moulds are stronger
  - thin sections can be easily obtained \*
  - highly complex sections can be easily obtained
  - high production rate is possible
2576. For mounting several patterns at a time, following type of pattern is used
- combined pattern
  - loose, piece pattern
  - sweep pattern
  - match plate pattern \*
  - metallic pattern
2577. Draft on pattern for casting is
- shrinkage allowance
  - identification number marked on it
  - taper to facilitate its removal from mould \*
  - increase in size of cavity due to shaking of pattern
  - for machining allowance
2578. Strength and permeability of served sand are related to
- grain size
  - clay-content
  - hardness
  - moisture content \*
  - type of sand
2579. Casting process is preferred for parts having
- a few details
  - many details \*
  - no details
  - non-symmetrical shape
  - none of the above
2580. In order to facilitate the withdrawal of pattern
- pattern is made smooth
  - water is applied on pattern surface
  - allowances are made on pattern
  - draft is provided on pattern \*
  - withdrawing facilities are provided
2581. Least shrinkage allowance is provided in the case of following
- brass \*
  - aluminium
  - cast iron
  - steel
  - white cast iron
2582. The draft allowance on the patterns is provided in order to
- provide good draft of air in the sand moulding
  - provide for distortion that might take place
  - remove the pattern easily from the moulding \*
  - increase the strength of the mould walls
  - push the pattern easily into the moulding
2583. The taper provided on pattern for its easy and clean withdrawal from the mould is called
- taper allowance
  - draft allowance \*
  - distortion allowance
  - pattern allowance
  - casting allowance
2584. The draft allowance on metallic pattern in comparison to wooden ones is
- same
  - more
  - less \*
  - more/less depending on size
  - none of the above
2585. A big advantage of using synthetic sand in foundry shop is that
- it is less costly
  - its properties can be controlled easily \*
  - it possesses high moisture
  - it possesses high % of clay
  - it is highly refractory
2586. Which of the following materials has more shrinkage allowance
- cast iron
  - brass
  - lead \*
  - aluminium alloy
  - steel
2587. Which of the following provides an added projection on a pattern and forms a seat to support and locate the core in the mould
- mould print
  - core print \*
  - drag
  - cope
  - chaplet
2588. The mould is housed in a
- flask \*
  - cope
  - drag
  - cheek
  - moulding box
2589. Loose piece patterns are
- a sort of split patterns
  - used when the pattern cannot be drawn from the mould \*
  - similar to core prints
  - never used in foundry work
  - none of the above
2590. Cores are used to
- make desired recess in casting \*
  - strengthen moulding sand
  - support loose pieces
  - remove pattern easily
  - none of the above
2591. Trowel is
- a round sieve
  - a long, flat metal plate fitted with an offset handle\*
  - used to make or repair corners in a mould
  - used to scoop sand deep in the mould
  - none of the above

2592. Shrinkage allowance is made by
- adding to external and internal dimensions
  - subtracting from external and internal dimensions
  - subtracting from external dimensions and adding to internal dimensions
  - adding to external dimensions and subtracting from internal dimensions \*
  - none of the above
2593. Wood for pattern is considered dry when moisture content is
- zero per cent
  - 5%
  - less than 15% \*
  - less than 25%
  - none of the above
2594. Which of the following is not a casting process
- carthias process
  - extrusion \*
  - semi-centrifuge method
  - slush process
  - shell moulding
2595. The purpose of gate is to
- feed the casting at a rate consistent with the rate of solidification \*
  - act as reservoir for molten metal
  - help feed the casting until all solidification takes place
  - feed molten metal from pouring basin to gate
  - none of the above
2596. Pick up the correct statement
- Loose piece patterns are used when the pattern can be drawn from the mould
  - Sweep patterns eliminate the need for three dimensional patterns \*
  - Match plate patterns are made by fastening each half of a split pattern on the same side of one plate
  - Cope and drag patterns are solid one piece patterns
  - Disposable patterns are made of wood
2597. Lifter is
- a round sieve
  - a long, flat metal plate fitted with an offset handle
  - used to make or repair corners in a mould
  - used to scoop sand deep in the mould \*
  - none of the above
2598. The impurities in true centrifugal casting
- get collected at outer surface
  - mix up thoroughly throughout
  - get collected at the inner surface \*
  - get collected in the middle portion in between inner and outer surface
  - are thrown out
2599. Which of the following type of sand is used to keep the green sand from sticking to the pattern
- burnt sand
  - synthetic sand
  - core sand
  - parting sand \*
  - loam sand
2600. Facing sand used in foundry work comprises of
- alumina, silica and clay
  - silica and clay \*
  - clay and alumina
  - silica and alumina
  - clay and silica
2601. Loam sand comprises of
- 50% sand and 10% moisture
  - 40% clay and 10% moisture
  - 50% clay and 18% moisture \*
  - 80% clay and 20% moisture
  - none of the above
2602. Dilatometer is used to find out following property of moulding sand
- permeability
  - moisture content
  - hot strength \*
  - compactness
  - fineness
2603. The purpose of sprue is to
- feed the casting at a consistent with the rate of solidification
  - act as reservoir for molten metal
  - help feed the casting until all solidification takes place
  - feed molten metal from pouring basin to gate \*
  - none of the above
2604. Accuracy of shell moulding is of the order of
- 0.001 mm/mm
  - 0.003 to 0.005 mm/mm \*
  - 0.01 mm/mm
  - 0.1 mm
  - none of the above
2605. The mould for casting ferrous materials in continuous casting process is made of
- low carbon steel
  - medium carbon steel
  - high carbon steel
  - copper \*
  - none of the above
2606. Sand slinger gives
- better packing of sand near pattern
  - better packing of sand near the flask
  - uniform sand density in the mould
  - all of the above
  - none of the above \*
2607. The trowel in a foundry shop is used to
- ram the moulding sand
  - swab the edges and the mould cavity
  - blow excess sand
  - repair corners in a mould
  - flatten and smoothen the sand during moulding operation \*

2608. When using disposable pattern, the metal should be poured
- very slowly
  - rather rapidly \*
  - at same rate as for other casting process
  - any rate
  - none of the above
2609. If  $V$  is the volume of metal in a casting and  $A$  its surface area, then time of solidification will be proportional to
- $V, \frac{1}{A}$
  - $V, \frac{1}{A^2}$
  - $V^2, \frac{1}{A}$
  - $V^2, \frac{1}{A^2} *$
  - $\frac{1}{V^2}, A^2$
2610. The purpose of pouring basin is to
- feed the casting at a rate consistent with the rate of solidification
  - act as reservoir for molten metal \*
  - help feed the casting until all solidification takes place
  - feed molten metal from pouring basin to gate
  - none of the above
2611. Match plate pattern is used in
- green sand moulding
  - bench moulding
  - pit moulding
  - machine moulding \*
  - none of the above
2612. For steel castings, the following type of sand is better
- fine-grain
  - coarser grain \*
  - medium grain
  - all are equally good
  - none of the above
2613. As the size of castings increases, it is often better to use increasingly
- fine grain
  - medium grain
  - coarse grain \*
  - any one of the above
  - none of the above
2614. The purpose of riser is to
- feed the casting at a rate consistent with the rate of solidification
  - act as a reservoir for molten metal
  - help feed the casting until all solidification takes place \*
  - feed molten metal from pouring basin to gate
  - none of the above
2615. Slick is
- a round sieve
  - a long, flat metal plate fitted with an offset handle
  - used to make or repair corners in a mould \*
  - used to scoop sand deep in mould
  - none of the above
2616. Freezing ratio or relative freezing time according to Caine's equation is
- $\frac{A_C / V_C}{A_R / V_R} *$
  - $\frac{A_R / V_R}{A_C / V_C}$
  - $\frac{V_C / A_C}{V_R / A_R}$
  - $\frac{V_R / A_R}{V_C / A_C}$
  - $\frac{A_C A_R}{V_C V_R}$
- (where  $A_C$  and  $A_R$  are areas of casting and riser and  $V_C$  and  $V_R$  are their volumes)
2617. Hot tear refers to
- casting defect \*
  - process of fabrication
  - process of heat treatment
  - weathering of non-ferrous materials
  - strengthening of alloys
2618. Slick in a foundry shop is used to
- make and repair corners in a mould \*
  - thoroughly mix up moulding sand
  - make venting holes in the mould
  - prepare gates
  - swab the edges of the mould cavity
2619. True centrifugal casting
- is used to ensure purity and density at extremities of a casting
  - is used to cast symmetrical objects \*
  - is used to obtain high density and pure castings
  - uses a heavy cast iron mould to act as chill
  - none of the above
2620. In a permanent mould casting method
- molten metal is fed into the cavity in metallic mould by gravity \*
  - metal is poured into die cavity and after a predetermined time the mould is inverted to permit a part of metal still in molten state to flow out of cavity
  - cavity is filled with a precalculated quantity of metal and a core or plunger is inserted to force the metal into cavity
  - metal is forced into mould under high pressure
  - none of the above
2621. Investment casting is used for
- shapes which are made by difficulty using complex patterns in sand casting
  - mass production
  - shapes which are very complex and intricate and can't be cast by any other method \*
  - there is nothing like investment casting
  - stainless steel parts



2622. The material of pattern in the case of investment casting is  
 a. thermosetting resin  
 b. special plastic  
 c. synthetic sand  
 d. wax \*  
 e. mercury
2623. Pipes subjected to very heavy pressures of the order of 100 kg/cm<sup>2</sup> are made by  
 a. electric resistance welding process  
 b. centrifugal casting  
 c. die casting  
 d. extrusion process, as seamless pipes \*  
 e. gravity continuous casting
2624. Water pipes of large length and diameter are made by  
 a. semi-centrifugal casting \*  
 b. continuous casting  
 c. sand casting  
 d. electric resistance welding  
 e. forging
2625. Which of the following processes would produce strongest components  
 a. die casting                      b. hot rolling  
 c. extrusion                        d. cold rolling  
 e. forging \*
2626. The runners and ingates, respectively are located as follows in casting of ferrous metals  
 a. in cope and in drag \*  
 b. in drag and in cope  
 c. both in cope  
 d. both in drag  
 e. in any of the above arrangements
2627. Which of the following processes refers to the preparation of objects from pressed powders  
 a. electroforming  
 b. shell moulding  
 c. semi-centrifugal casting  
 d. permanent mould casting  
 e. none of the above \*
2628. The longitudinal joint of drums of 150 mm thick sheets are made by  
 a. electric arc  
 b. plasma arc welding  
 c. electro slag welding \*  
 d. resistance welding  
 e. laser beams
2629. Antioch process is a  
 a. continuous casting process  
 b. welding process  
 c. process of making porous moulds \*  
 d. brazing process  
 e. there is nothing like antioch process
2630. In centrifugal casting, cores are made of  
 a. steel  
 b. cast iron  
 c. hard sand  
 d. plastic  
 e. none of the above \*
2631. Semi-centrifugal casting  
 a. is used to ensure purity and density at extremities of a casting \*  
 b. is used to cast symmetrical objects  
 c. is used to obtain high density and pure castings  
 d. uses heavy cast iron mould to act as chill  
 e. is not used for any purpose
2632. For gray cast iron, the pattern shrinkage allowance is of the order of  
 a. 2 to 5 mm/m                      b. 5 to 7 mm/m  
 c. 7 to 10.5 mm/m \*                d. 10.5 to 13.5 mm/m  
 e. 13.5 to 18 mm/m
2633. Surfaces to be machined are marked on  
 a. black                                b. yellow  
 c. red \*                                d. blue  
 e. green
2634. Colour scheme is employed on patterns in order to identify the  
 a. pattern allowances  
 b. cope and drag  
 c. location of core print  
 d. material of pattern  
 e. none of the above \*
2635. Blue colour on the pattern is marked for  
 a. machined surfaces  
 b. unfinished surfaces  
 c. loose piece pattern  
 d. surfaces to be chilled  
 e. never used in pattern making operation \*
2636. For gray cast iron, the volumetric shrinkage is of the order of  
 a. 6% - 5%  
 b. 5 - 3.5%  
 c. 3.5% - 2.5%  
 d. 2.5 - 1.9%  
 e. 1.9% to negative value \*
2637. The pouring temperature for grey cast iron is  
 a. 1000°C                              b. 1250°C  
 c. 1400°C \*                            d. 1550°C  
 e. 1650°C
2638. Chilled surfaces are marked on the pattern by  
 a. oblique red strips  
 b. yellow cross strips  
 c. black cross strips on yellow  
 d. oblique red strips on yellow \*  
 e. none of the above

2639. Centrifugal method of casting is used to
- ensure purity and density at extremities of a casting
  - cast symmetrical objects
  - obtain high density and pure castings \*
  - use heavy cast iron mould to act as chill
  - none of the above
2640. A large intricate heavy casting weighing in tons is to be cast. The most appropriate moulding process would be
- machine moulding
  - pit moulding \*
  - cement moulding
  - green sand moulding
  - ceramic moulding
2641. The patterns in the case of machine moulding are mounted on
- match plates \*
  - moulding boards
  - follow boards
  - steel table
  - plastic boards
2642. In die casting process
- molten metal is fed into the cavity in metallic mould by gravity
  - metal is poured into die cavity, and after a predetermined time the mould is inverted to permit a part of metal still in molten state to flow out of cavity
  - cavity is filled with a precalculated quantity of metal and a core or plunger is inserted to force the metal into cavity
  - metal is forced into mould under high pressure \*
  - none of the above
2643. The hot chamber die casting method is used to cast
- brass
  - magnesium
  - aluminium
  - alloys of lead, tin and zinc \*
  - all of the above
2644. In hot chamber method of die casting
- only low melting point metals can be cast \*
  - high melting point metals can be cast
  - die is kept hot by circulating water
  - die is kept cold by circulating water
  - none of the above
2645. In general, the draft on castings is of the order of
- 1-5 mm/m
  - 5-10 mm/m
  - 10-15 mm/m \*
  - 15-20 mm/m
  - 20-30 mm/m
2646. Blind rises
- assist in feeding the metal into casting proper
  - help to trap slag or other lighter particles
  - supply the hottest metal when pouring is completed\*
  - do not exist
  - none of the above
2647. The allowances to be provided in disposable patterns are
- shrinkage and finish
  - distortion
  - draft
  - shake
  - both 'a' and 'b' are correct \*
2648. Honey combing/sponginess refers to
- presence of impurities in molten metal
  - molten metal at low temperature
  - formation of a number of cavities in close proximity in casting \*
  - defects due to poor heat treatment
  - surface defects produced during hot working
2649. In carthias process
- molten metal is fed into the cavity in metallic mould by gravity
  - metal is poured into die cavity and after a predetermined time the mould is inverted to permit a part of metal still in molten state to flow out of cavity
  - cavity is filled with a precalculated quantity of metal and a core or plunger is inserted to force the metal into cavity \*
  - metal is forced into mould under high pressure
  - none of the above
2650. The sand is packed on pit moulds with
- manually
  - squeezers
  - jolt machines
  - sand slingers \*
  - portable blowers
2651. Sprue in casting refers to
- gate
  - runner
  - riser
  - horizontal passage
  - vertical passage \*
2652. Pick up the incorrect statement about advantages of disposable patterns
- finish is uniform and reasonably smooth
  - no complex wooden pattern with loose piece pattern is required
  - no cores are required
  - patterns can be handled easily and process is adaptable to mechanical moulding equipment \*
  - no allowances and hence less metal is required
2653. In cold chamber method of die casting
- only low melting point metals can be cast
  - high melting point metals can be cast \*
  - die is kept hot by electrical heating
  - die is kept cold by circulating water
  - none of the above
2654. Which of the following casting methods utilises wax pattern
- shell moulding
  - plaster moulding
  - slush casting
  - investment casting \*
  - semi-centrifugal casting

2655. In slush casting process
- molten metal is fed into the cavity in metallic mould by gravity
  - metal is poured into die cavity and after a predetermined time the mould is inverted to permit a part of metal still in molten state to flow out of cavity \*
  - cavity is filled with a precalculated quantity of metal and a core or plunger is inserted to force the metal into cavity
  - metal is forced into mould under high pressure
  - none of the above
2656. In slush casting
- consumable patterns are used
  - plunger is used to force molten metal to fill up cavities
  - vacuum is applied to facilitate complete filling of casting
  - when a solid shell of sufficient thickness has formed, remaining liquid is poured out \*
  - mercury is used for filling the master mould at normal temperature
2657. Pick up incorrect statement about advantages of vacuum die casting
- it produces good quality castings
  - porosity is reduced
  - surface finish is improved
  - less metal is used \*
  - injection pressure is reduced
2658. Ornaments are cast by
- die casting
  - continuous casting
  - pressed casting \*
  - centrifugal casting
  - gravity casting
2659. Ornamental objects, statues, toys etc. are cast by
- die casting
  - pressed casting
  - centrifugal casting
  - slush casting \*
  - none of the above
2660. Steel and cast iron pipes are cast by
- die casting
  - continuous casting
  - true centrifugal casting \*
  - centrifuging
  - investment casting
2661. In hot chamber method of die casting
- the melting pot is integral with die casting machine\*
  - the melting pot is separate from die casting machine
  - melting pot location has nothing to do with such a classification
  - high temperature and low pressure alloys are used
  - none of the above
2662. Scabs or buckles are the casting defects
- which occur due to some sand shearing from the cope \*
  - which take the form of internal voids or surface depression due to excessive gaseous material not able to escape
  - which occur due to discontinuity in metal casting resulting from hindered contraction
  - caused by two streams of metals that are too cold to fuse properly
  - none of the above
2663. In centrifugal casting, the impurities are
- uniformly distributed
  - collected in the centre of casting \*
  - forced outside the surface
  - present in the middle section of casting
  - none of the above
2664. The core in the centrifugal casting is made of
- carbon steel
  - properly treated sand
  - plastic
  - abrasive material
  - no core is used \*
2665. Large and heavy castings are made by
- green moulding \*
  - pit moulding
  - dry sand moulding
  - pressure moulding
  - machine moulding
2666. Graphite moulds are used for continuous casting process in order to provide
- non-wetting agent
  - self lubricating qualities \*
  - chilling effect
  - heat resisting medium
  - quick solidification of metal
2667. Ferrous alloys are usually cast by
- hot chamber machine
  - cold chamber machine
  - die casting machine
  - direct blow machine
  - none of the above \*
2668. The tolerances produced by the investment casting process are of the order of
- a few microns
  - $\pm 0.05$  mm \*
  - $\pm 1$  mm
  - $\pm 5$  mm
  - none of the above
2669. In cold chamber method of die casting
- The melting pot is integral with die casting machine
  - the melting pot is separated from die casting machine \*
  - melting pot is separate from die casting machine
  - low temperature and low pressure alloys are used
  - none of the above

2670. Sweep pattern is used for moulding parts having
- rectangular shape
  - elliptical shape
  - uniform symmetrical shape \*
  - complicated shape having intricate details
  - none of the above
2671. Centrifugal process is
- limited to symmetrical objects about horizontal axis
  - limited to symmetrical objects about vertical axis
  - used for producing castings of irregular shape \*
  - used for producing one casting at a time
  - none of the above
2672. Drossing in foundry practice refers to
- a method of cleaning the castings
  - an inspection method for castings
  - a method of deoxidation of molten metal
  - the formation of oxides on the molten metal surface \*
  - improving finish of castings
2673. During the freezing of a pure metal, the possible casting structure is
- columnar structure \*
  - dendritic structure
  - equal-axed grains structure
  - partly columnar and partly equi-axed
  - dendritic and columnar
2674. When an alloy solidifies over a short range of temperature the resulting casting structure will be
- dendritic
  - partially columnar and partially equi-axed
  - wholly columnar \*
  - wholly equi-axed
  - dendritic and columnar
2675. When an alloy solidifies over a wide range of temperature, the resulting casting structure is
- wholly equi-axed
  - wholly columnar
  - partially columnar and partially equi-axed
  - dendritic \*
  - columnar
2676. Flogging in foundry practice refers to
- a type of moulding method
  - removal of sprues and risers \*
  - a non-destructive testing method
  - removal of slag during pouring
  - a casting defect
2677. The internal cracks in casting can be easily found out by the following method of testing
- magnetic particle inspection
  - fluorescent penetrant
  - ultrasonic \*
  - dye-penetrant
  - any one of the above
2678. The surface and sub-surface cracks in nonmagnetic alloys can be easily located and detected by the following inspection method
- X-ray testing
  - ultrasonic testing
  - magnetic particle inspection testing
  - dye-penetrant testing \*
  - any one of the above
2679. The internal hot tear defects in castings can be inspected by the following method
- radiography \*
  - visual inspection
  - damping test
  - fluorescent penetrant test
  - hardness test
2680. Hot tears are casting defects
- which occur due to some sand shearing from the cope surface
  - which take the form of internal voids or surface depression due to excessive gaseous material not able to escape
  - which occur due to discontinuity in metal casting resulting from hindered contraction \*
  - caused by two streams of metals that are too cold to fuse properly
  - none of the above
2681. Fettling is an operation performed
- before casting
  - during casting
  - after casting \*
  - after heat treatment
  - before heat treatment
2682. vertical centrifugal castings as compared to horizontal centrifugal castings are spun at
- higher speed \*
  - slower speed
  - same speed
  - unpredictable
  - none of the above
2683. Shell moulding process requires
- wooden patterns
  - sand patterns
  - plastic patterns
  - metal patterns \*
  - no patterns
2684. Cold shots are casting defects
- which occur due to some sand shearing from the cope surface
  - which take the form of internal voids or surface depression due to excessive gaseous material not able to escape
  - which occur due to discontinuity in metal casting resulting from hindered contraction
  - caused by two streams of metals that are too cold to fuse properly \*
  - none of the above

2685. Slag inclusion in casting is a  
 a. surface defect \*      b. internal defect  
 c. crack                      d. notch  
 e. no defect
2686. A sprue hole is  
 a. a casting defect  
 b. a hole made for riveting  
 c. a blind hole in jigs  
 d. an eccentric hole in dies for clamping  
 e. an opening in mould for pouring molten metal \*
2687. Core prints are used to  
 a. strengthen core  
 b. form seat to support and hold the core in place \*  
 c. fabricate core  
 d. all of the above  
 e. none of the above
2688. Jolt machines produce  
 a. uniform ramming about the pattern \*  
 b. uniform ramming about the flask  
 c. uniform distribution throughout  
 d. pack sand loosely all around  
 e. none of the above
2689. Blow holes are casting defects  
 a. which occur due to some sand shearing from the cope surface  
 b. which take the form of internal voids or surface depression due to excessive gaseous material not able to escape \*  
 c. which occur depression due to discontinuity in metal casting resulting from hindered contraction  
 d. caused by two streams of metals that are too cold to fuse properly  
 e. none of the above
2690. In salvage repair of castings, the most satisfactory and commonly used method of rectifying and repairing the defect  
 a. brazing and soldering  
 b. metal spraying \*  
 c. painting  
 d. galvanizing  
 e. welding
2691. Cold ducts are  
 a. forging defects due to insufficient filling  
 b. pores in welds  
 c. casting defects due to two streams not able to fuse due to being cool \*  
 d. casting defects due to moisture  
 e. machining defects
2692. Molten iron is desulphurized by adding following to the ladle  
 a. carbon                      b. ferromanganese  
 c. ferro-silicon              d. soda ash \*  
 e. graphite
2693. Which is incorrect statement about results of cold working  
 a. it increases corrosion resistance \*  
 b. it increases strength, elasticity and hardness with a corresponding decrease in ductility  
 c. handling of parts is easier  
 d. dimension tolerances and finish are high  
 e. recrystalline temperature for steel is increased
2694. Coining is the operation of  
 a. cold forging \*              b. hot forging  
 c. cold extrusion              d. piercing  
 e. reeling
2695. In the metal forming processes, the stresses encountered are  
 a. less than the yield strength of the material  
 b. less than the fracture strength of the material and greater than yield strength \*  
 c. greater than the ultimate strength of the material  
 d. less than the limit of proportionality  
 e. less than the elastic limit
2696. Rotary swaging is used for  
 a. manufacturing bolts and rivets  
 b. manufacturing seamless tubes  
 c. improving fatigue resistance  
 d. reducing diameter of round bars and tubes by rotating die which open and close rapidly on the work \*  
 e. providing desired contour to sheet metal
2697. The important property of a material in all metal forming process is  
 a. elasticity                      b. plasticity \*  
 c. ductility                      d. brittleness  
 e. toughness
2698. Hot press forging  
 a. causes a steadily applied pressure instead of impact force \*  
 b. is used to force the end of a heated bar into a desired shape  
 c. is a forging operation in which two halves of a rotating die open and close rapidly while impacting the end of heated tube or shell  
 d. is a forging method for reducing the diameter of a bar and in the process making it longer  
 e. none of the above
2699. Swaging is an operation of  
 a. hot rolling                      b. forging \*  
 c. extrusion                      d. piercing  
 e. drawing
2700. Plug rolling is used to  
 a. produced collapsible tubes  
 b. produce seamless tubes  
 c. reduce diameter of tubes  
 d. increase wall thickness of tubes  
 e. reduce wall thickness and increase diameter of tubes \*

2701. An important product manufactured by rolling is  
 a. I-section \*                      b. tubes  
 c. metal rolls                      d. rollers  
 e. discs
2702. Which is incorrect statement about results of hot working  
 a. annealing operation is not necessary  
 b. power requirements are low  
 c. surface finish is good \*  
 d. grain refinement is possible  
 e. porosity in the metal is largely eliminated
2703. Forging of plain carbon steel is carried out at  
 a. 750°C                              b. 900°C  
 c. 1100°C                            d. 1300°C \*  
 e. 1450°C
2704. Which of the following materials can't be forged  
 a. wrought iron  
 b. cast iron \*  
 c. mild steel  
 d. high carbon steel  
 e. H.S.S.
2705. Swaging  
 a. causes a steadily applied pressure instead of impact force  
 b. is used to force the end of a heated bar into a desired shape  
 c. is a forging operation in which two halves of a rotating die open and close rapidly while impacting the end of the heated tube or shell \*  
 d. is a forging method for reducing the diameter of a bar and in the process making it longer  
 e. none of the above
2706. Metals like lead and tin are hot worked at temperatures around  
 a. 500-600°C  
 b. 200-300°C  
 c. 100°C  
 d. room temperature \*  
 e. -100°C
2707. Mechanical properties of the metal improve in hot working due to  
 a. recovery of grains  
 b. recrystallisation  
 c. grain growth  
 d. refinement of grain size \*  
 e. formation of columnar grains
2708. The following type of deformation of metals takes place in cold working and hot working  
 a. elastic deformation  
 b. plastic deformation \*  
 c. viscous deformation  
 d. isotropic deformation  
 e. visco-elastic deformation
2709. Pick up wrong statement about results of hot working  
 a. poor surface finish  
 b. improvement in mechanical properties  
 c. refinement in grain structure  
 d. close tolerances obtained \*  
 e. eliminated of polarity
2710. The important mechanical property for a material to be successfully rolled or forged is  
 a. brittleness                      b. ductility  
 c. elasticity                        d. machinability  
 e. malleability \*
2711. Pick up wrong statement about effect of cold working  
 a. increase in strength and hardness  
 b. improved surface finish  
 c. close dimensional tolerances  
 d. grain structure is unaffected \*  
 e. increase in yield strength
2712. The important mechanical property of a material for extrusion purpose is  
 a. continuity                      b. ductility  
 c. elasticity                        d. plasticity \*  
 e. brittleness
2713. The increase in hardness due to cold working is called  
 a. cold hardening                b. hot hardening  
 c. work hardening \*            d. age-hardening  
 e. induction hardening
2714. In which type of extrusion process, the movement of the extruded product is in the direction opposite to that of the deforming force  
 a. direct                            b. forward  
 c. backward \*                    d. die extrusion  
 e. wire drawing
2715. Hot working operation is carried at  
 a. recrystallisation temperature  
 b. near plastic stage temperature  
 c. below recrystallisation temperature  
 d. above recrystallisation temperature \*  
 e. above room temperature
2716. Roll forging  
 a. causes a steadily applied pressure instead of impact force  
 b. is used to force the end of a heated bar into a desired shape  
 c. is a forging operation in which two halves of a rotating die open and close rapidly while impacting the end of heated tube or shell  
 d. is forging method for reducing the diameter of a bar and in the process making it longer \*  
 e. none of the above
2717. A cylindrical section having no joints is  
 a. seamless \*                      b. ideal  
 c. economical                    d. perfect  
 e. jointless

2718. Seamless tubes are made by  
 a. piercing \*                      b. extrusion  
 c. cold rolling                    d. plug rolling  
 e. rolling mill
2719. The operation of removing the burr or flash from the forged parts in drop forging is known as  
 a. lancing                          b. trimming \*  
 c. coining                          d. shot peening  
 e. burring
2720. Metallic cans are usually mass produced by the following process  
 a. embossing                      b. coining \*  
 c. spinning                        d. drawing  
 e. extruding
2721. Spinning operation is carried out on  
 a. hydraulic press                b. mechanical press  
 c. lathe \*                          d. milling machine  
 e. drill press
2722. Production of contours in flat blanks is termed as  
 a. blanking \*                      b. piercing  
 c. perforating                    d. punching  
 e. none of the above
2723. Thread rolling is somewhat like  
 a. cold extrusion                b. cold machining  
 c. cold rolling \*                d. cold forging  
 e. plug rolling
2724. Upset forging  
 a. cause a steadily applied pressure instead of impact force  
 b. is used to force the end of a heated bar into a desired shape \*  
 c. is a forging operation in which two halves of rotating die open and close rapidly while impacting the end of the heated tube or shell  
 d. is a forging method for reducing the diameter of a bar and in the process making it longer  
 e. none of the above
2725. Which of the following process is different from the rest of the processes  
 a. shot peening  
 b. cold extrusion  
 c. sand blasting  
 d. drop forging \*  
 e. cold rolling
2726. It is required to reduce a slab directly to strip in one phase. Which of the following rolling mills can do this function ?  
 a. two high mill  
 b. three high mill  
 c. four high mill  
 d. planetary mill \*  
 e. continuous rolling mill
2727. In four high rolling mill the bigger rollers are called  
 a. guide rolls                    b. back up rolls \*  
 c. main rolls                    d. support rolls  
 e. none of the above
2728. A polished and etched surface of the cross-section of a hot worked product will be having  
 a. fibre like structure \*  
 b. mirror like surface  
 c. grain field like structure  
 d. carbon precipitated at boundaries  
 e. carbon in the form of flakes
2729. The machinery/equipment used in the production of channels of I-section, rail sections, angles, etc. is called  
 a. continuous casting machine  
 b. rolling mills \*  
 c. forging plant  
 d. hot spinning machines  
 e. extrusion mills
2730. In a four high rolling mill, the diameter of backing up roll in comparison to diameter of working rolls is  
 a. same  
 b. larger \*  
 c. smaller  
 d. smaller/larger depending upon the capacity  
 e. no such correlation
2731. Large size bolt heads are made by  
 a. swaging                        b. roll forging  
 c. tumbling                      d. upset forging \*  
 e. hammer forging
2732. Symmetrical hollow parts of circular cross-section are made by hot  
 a. forging                        b. extrusion  
 c. piercing                        d. drawing  
 e. spinning \*
2733. The pilots in the punch holder assembly in press working operations are provided in order to  
 a. ensure proper ejection of the blank  
 b. ensure proper location of the blank \*  
 c. reduce the punch load  
 d. remove the burrs on the blank  
 e. form a corresponding depression in the blank first
2734. Notching is the operation of  
 a. removal of excess metal from the edge of a strip to make it suitable for drawing without wrinkling \*  
 b. cutting of the excess metal at edge which was required for gripping purpose during press working operation  
 c. cutting in a single line across a part of the metal strip to allow bending or forming in progressive die operation while the part remains attached to the strip  
 d. punching in which punch is stopped as soon as the metal fracture is complete and metal is not removed but held in hole  
 e. none of the above

2735. The collapsible tooth paste tubes are manufactured by
- direct extrusion
  - piercing
  - impact extrusion \*
  - indirect extrusion
  - ERW (electric resistance welding) process
2736. Tumbling is the process of
- improving fatigue limit
  - imparting lustre to surface
  - cleaning the surface of small parts \*
  - improving creep limit
  - providing coating on metal surface
2737. Which of the following is the process for joining two metals
- sintering
  - tumbling
  - notching
  - swaging \*
  - coining
2738. The seamless tubes in mass production are manufactured by the following process
- rolling
  - spinning
  - drawing
  - welding
  - extrusion \*
2739. Stretch forming is a process of
- cold rolling
  - forging
  - extrusion
  - cold drawing \*
  - spinning
2740. Lancing is the operation of
- removal of excess metal from the edge of a strip to make it suitable for drawing without wrinkling
  - cutting of the excess metal at edge which was required for gripping purpose during press working operation
  - cutting in a single line across a part of the metal strip to allow bending or forming in progressive die operation while the part remains attached to the strip \*
  - punching in which punch is stopped as soon as the metal is not removed but held in hold
  - none of the above
2741. Flange wrinkling is the defect found in
- blanking
  - spinning
  - bending
  - cold rolling
  - deep drawing \*
2742. Laser is produced by
- graphite
  - ruby \*
  - diamond
  - emerald
  - aluminium
2743. Injection moulding is the ideal method of processing
- plastics
  - thermo-setting plastics \*
  - thermoplastics
  - non-ferrous materials
  - none of the above
2744. Compression moulding is the ideal method of processing
- plastics
  - thermosetting plastics
  - thermoplastics \*
  - non-ferrous materials
  - cast iron
2745. Slugging is the operation of
- removal of excess metal from the edge of strip to make it suitable for drawing without wrinkling
  - cutting of the excess metal at edge which was required for gripping purpose during press working operation
  - cutting in a single line across a part of the metal strip to allow bending or forming in progressive die operation while the part remains attached to the strip
  - punching in which punch is stopped as soon as the metal fracture is complete and metal is not removed but held in hole \*
  - none of the above
2746. A 20 tonne implies that the
- weight of press is 20 tonnes
  - press can handle works weighting upto 20 tonnes
  - it can exert pressure upto 20 tonnes \*
  - its foundation should be designed for 20 tonnes
  - its turnover in a day is 20 tonnes
2747. The fatigue strength of metal is improved by setting up compressive stresses in the surface by a process known as
- lancing
  - spinning
  - hemming
  - shot-peening \*
  - slugging
2748. In drawing operation the metal flows due to
- ductility
  - work hardening
  - plasticity \*
  - shearing
  - yielding
2749. Trimming is the operation of
- removal of excess metal from the edge of a strip to make it suitable for drawing without wrinkling
  - cutting of the excess metal at edge which was required for gripping purpose during press working operation \*
  - cutting in a single line across a part of the metal strip to allow bending or forming in progressive die operation while the part remains attached to the strip
  - punching in which punch is stopped as soon as the metal fracture is completed and metal is not removed but held in hole
  - none of the above



2750. Long wires are made by following process
- extrusion
  - rolling
  - piercing
  - drawing \*
  - non-conventional methods
2751. Hemming is the operation
- In which the edges of sheet are turned over to provide stiffness and a smooth edge \*
  - of producing contours in sheet metal and of bending previously roll formed sections
  - in which a series of impact blows are transferred on dies so that solid or tubular work changes in cross-section or geometric shape
  - employed to expand a tubular or cylindrical part
  - none of the above
2752. Which of the operation is different from the rest
- rivetting
  - embossing
  - punching \*
  - coining
  - flattening
2753. External screw threads can be produced fastest by
- milling
  - chasing
  - casting
  - rolling \*
  - automats
2754. In combination dies
- two or more cutting operations can be performed simultaneously
  - cutting and formation operations are combined and carried out in single operation \*
  - work piece moves from one station to other with separate operation performed at each station
  - all of the above
  - none of the above
2755. The purpose of jigs and fixtures is to
- increase production rate
  - increase machining accuracy
  - facilitate interchangeable manufacture
  - enable employ less skilled operators
  - all of the above \*
2756. Bulging is the operation
- in which the edges of sheet are turned over to provide stiffness and a smooth edge
  - of producing contours in sheet metal and of bending previously roll formed sections
  - in which series of impact blows are transferred on dies so that solid or tubular work changes in cross-section or geometric shape
  - employed to expand a tubular or cylindrical part \*
  - none of the above
2757. Gear shaping is related to
- template
  - from tooth process
  - hob \*
  - generating
  - all of the above
2758. Which one of the following methods produces gear by generating process
- hobbing \*
  - casting
  - punching
  - milling
  - broaching
2759. Gears are best mass produced by
- milling
  - hobbing \*
  - shaping
  - forming
  - casting
2760. Which of the following is a gear finishing operation
- hobbing
  - shaping
  - milling
  - shaving or burnishing \*
  - none of the above
2761. In press operation, the size of the pierced hole is dependent on the size of
- punch \*
  - die
  - average of punch and die
  - punch and clearance
  - die and clearance
2762. Steel billets for extrusion are heated in the range of
- 750-1000°C
  - 1000-1100°C
  - 1100-1200° \*
  - 1200-1350°C
  - 1350-1450°C
2763. For drawing operation, the best suited press is
- knuckle joint press
  - crank shaft and connecting rod press
  - toggle press \*
  - rack and pinion press
  - none of the above
2764. Swaging is the operation
- in which the edges of sheet are turned over to provide stiffness and a smooth edge
  - of producing contours in sheet metal and of bending previously roll formed sections
  - in which a series of impact blows are transferred on dies so that solid or tubular work changes in cross-section or geometric shape \*
  - employed to expand a tubular or cylindrical part
  - none of the above
2765. Trimming is the process associated with
- press work \*
  - forging
  - polishing of metals
  - electroplating
  - machining
2766. The ductility of a material with hardening
- increases
  - decreases \*
  - remains unaffected
  - may increase/decrease depending on its tensile strength
  - unpredictable

2767. Blanking and piercing operation can be performed simultaneously in
- simple die
  - progressive die
  - compound die \*
  - combination die
  - none of the above
2768. In progressive dies
- two or more cutting operations can be performed simultaneously
  - cutting and formation operations are combined and carried out in single operation
  - work piece moves from one station to other with separate operation performed at each station \*
  - all of the above
  - none of the above
2769. Cutting and forming operations can be done in a single operation on
- simple die
  - progressive die
  - compound die
  - combination die \*
  - none of the above
2770. Stretch forming is the operation
- in which the edges of sheet are turned over to provide stiffness and a smooth edge
  - of producing contours in sheet metal and of bending previously roll formed sections \*
  - in which a series of impact blows are transferred on dies so that solid or tubular work changes in cross-section or geometric shape
  - employed to expand a tubular or cylindrical part
  - none of the above
2771. Cold heading is the process of
- chipless machining \*
  - high energy rate forming
  - explosive forming
  - magnetic pulse forming
  - non conventional method of machining
2772. Steel balls are manufactured by
- casting
  - machining
  - cold heading \*
  - sintering
  - spinning
2773. After cold forming, steel balls are subjected to
- normalising
  - tempering
  - electroplating
  - stress relieving \*
  - artificial aging
2774. In press operation, the size of the blanked part is dependent on the size of
- punch
  - die \*
  - average of punch and die
  - die and clearance
  - punch and clearance
2775. For operations like coining and embossing, the best suited press is
- knuckle joint press \*
  - crank shaft and connecting rod press
  - toggle press
  - rack and pinion press
  - none of the above
2776. In compound dies
- two or more cutting operations can be performed simultaneously \*
  - cutting and formation operations are combined and carried out in single operation
  - work piece moves from one station to other with separate operation performed at each station
  - all of the above
  - none of the above
2777. In drawing operation, increase of punch radius
- has much influence on punch load and it decreases
  - does not influence the punch load much \*
  - punch load increase
  - punch load depends on other factors
  - none of the above
2778. Angular clearance provided on dies is of the order of
- 5 to 10°
  - 3 to 5°
  - 1/2 to 1° \*
  - 0.1 to 0.5°
  - none of the above
2779. The spring back in steel is of the order of
- 0 to 0.5°
  - 0.5 to 5° \*
  - 5 to 10°
  - 10 to 13.5°
  - 13.5 to 17.5°
2780. Centre of pressure for a piece to be blanked or pierced in power press lies at
- c.g. of area of piece
  - c.g. of perimeter of piece \*
  - centre of piece
  - centre of percussion
  - none of the above
2781. In drawing operation, increase of die radius
- has much influence on punch load and it decreases\*
  - does not influence the punch load much
  - punch load increases
  - punch load depends on other considerations
  - none of the above
2782. Bending operation should be performed
- parallel to the grain direction
  - at 30° to the grain direction
  - at right angle to the grain direction \*
  - there is no such criterion
  - none of the above

2783. In bending operation, the metal takes shape of  
 a. die                                      b. punch \*  
 c. average of two                      d. could take any shape  
 e. none of the above
2784. In blanking operation, the clearance is provided on  
 a. die  
 b. punch \*  
 c. half on die and half on punch  
 d. may be provided on any member  
 e. none of the above
2785. Most practical method of taking care of spring back during bending is to  
 a. try a sample, make the necessary adjustments and try again \*  
 b. punching the inside corner of bend  
 c. use hollow concave punches  
 d. undercutting the punch so that the material is free to over bend  
 e. none of the above
2786. The velocity of operation in power drop hammer is of the order of  
 a. 0.1 to 0.8 m/sec                      b. 0.8 to 1.5 m/sec  
 c. 1.5 to 3.0 m/sec                      d. 3.0 to 9.0 m.sec \*  
 e. 9.0 to 16.0 m/sec
2787. Sheradising is  
 a. a zinc diffusion process \*  
 b. an oxidising process used for aluminium and magnesium articles  
 c. a process used for making thin phosphate coatings on steel to act as base or primer for enamels and paints  
 d. the process of coating of zinc by hot dipping  
 e. none of the above
2788. Parkerizing process is  
 a. a zinc diffusion process  
 b. an oxidising process used for aluminium and magnesium articles  
 c. a process used for making thin phosphate coatings on steel to act as a base or primer for enamels and paints \*  
 d. the process of coating of zinc by hot dipping  
 e. none of the above
2789. In electro-discharge machining, the tool is made of  
 a. tungsten carbide  
 b. properly heat treated alloy steel  
 c. diamond  
 d. brass or copper \*  
 e. stainless steel
2790. Which is false statement about electrodischarge machining  
 a. it can machine very hard materials  
 b. very good surface finish is obtained  
 c. section to be machined should be thick \*  
 d. metal removal rate is very slow  
 e. even heat treated metals can be machined
2791. In electro-chemical milling operation, the gap between tool and work is kept of the order of  
 a. no gap, two are in contact with each other  
 b. 0.25 mm \*  
 c. 0.75 mm  
 d. 1.25 mm  
 e. 5 mm
2792. In spark erosion machining process, the gap between tool and work piece is filled with  
 a. a photo etchant  
 b. brine solution  
 c. acid solutin  
 d. a liquid dielectric \*  
 e. an electrolyte solutin
2793. In the electro-discharge machining process, the work piece and the electrode are submerged in  
 a. a dielectric fluid \*  
 b. an abrasive slurry  
 c. an electrolytic solution  
 d. vaccum  
 e. chemical reagents
2794. The cutting tool used in the spark erosion machining process is called  
 a. arc                                              b. capacitor  
 c. electrode \*                                      d. dielectric  
 e. servo
2795. The machining process in which the metal of a work piece is dissolve into an electrolyte solution is called  
 a. electro-discharge machining  
 b. ultrasonic machining  
 c. electro-chemical machining \*  
 d. chemical machining  
 e. laser machining
2796. The machining method which uses abrasive slurry is known as  
 a. electro-discharge machining  
 b. laser machining  
 c. plasma arc machining  
 d. ultrasonic machining \*  
 e. chemical machining
2797. A big advantage of electro-chemical machining over electro-discharge machining is that  
 a. it can cut harder materials  
 b. it is more accurate and precise  
 c. it consumes less power  
 d. its cost is low  
 e. tool wear is negligible \*
2798. The size of abrasive grains in abrasive jet machining varies between  
 a. 1 to 10 microns                      b. 10 to 50 microns \*  
 c. 50 to 100 microns                      d. 100 to 500 microns  
 e. 500 to 1000 microns

2799. Which is the correct statement about electro-chemical grinding operation
- grinding pressure is high
  - very hard materials can be ground precisely \*
  - defects like grinding cracks, tempering of work take place
  - dimensional control is little problem
  - none of the above
2800. Machining centre is a
- numerical controlled (NC) machine tool
  - transfer machine tool
  - group of automatic machine tools
  - automatic tool changing unit
  - next logical step beyond NC machine \*
2801. Chemical milling operation is performed
- on plain milling machine
  - on universal milling machine
  - in a tank having agitator facility \*
  - on any one of the above machines
  - none of the above
2802. In the electrolytic grinding process, following type of grinding wheel is generally used
- aluminium oxide
  - silicon carbide
  - tungsten carbide
  - diamond \*
  - buffing wheel
2803. Chemical regents and etchants are used in the following machining method
- electrochemical
  - plasma arc
  - ultrasonic
  - chemical machining \*
  - laser
2804. In spark erosion machining process which is used for diesinking, the usual tool material is
- high speed steel
  - brass \*
  - tungsten carbide
  - diamond
  - stellite
2805. Laser stands for
- light amplification by stimulated emission of radiation \*
  - light amplification by strong emission of radiation
  - light amplification by stimulated energy of radiation
  - light amplification by stimulated energy of radiation
  - none of the above
2806. Laser beam machining process is used for machining
- very thick materials
  - thin materials \*
  - heavy sections
  - is not used for machining
  - there is no such limitation
2807. In abrasive jet machining process, the abrasive particles should be
- perfectly round
  - made of diamond powder
  - around 1 mm in size
  - of irregular shape \*
  - none of the above
2808. Sintered and tungsten carbides can be machined by
- brazing
  - grinding
  - diamond tools
  - hot machining
  - electro-machining process \*
2809. The machining rate in ultrasonic machining is high in case of following material
- hard
  - brittle \*
  - ductile
  - malleable
  - elastic
2810. Spark erosion machining method can be used for the machining of
- conducting materials only \*
  - non-conducting materials only
  - semi-conductors only
  - both conducting and non-conducting materials
  - any metal
2811. For machining to take place by spark erosion
- the tool must be immersed in the dielectric fluid
  - the work must be immersed in the dielectric fluid
  - both tool and work must be immersed in the dielectric fluid \*
  - no dielectric fluid is to be used
  - none of the above is true
2812. In spark erosion machining process, removal of metal takes place during
- charging of the capacitor
  - discharging of the capacitor \*
  - all times
  - alternate cycles only
  - none of the above
2813. In spark machining, erosion takes place
- on the job
  - on the tool
  - on both job and tool \*
  - on the dielectric itself
  - neither on tool nor on the job
2814. Ultrasonic machining removes material by
- direct vibration of tool with work piece
  - using abrasive slurry between tool and work \*
  - vibrating air in vicinity of tool and work piece and making no contact
  - all of the above
  - none of the above

2815. Very hard, fragile and heat sensitive materials can be machined by
- low melting point and high thermal conductivity
  - low melting point and low thermal conductivity
  - high melting point and high thermal conductivity\*
  - high melting point and high thermal conductivity
  - all of the above
2816. Very hard, fragile and heat sensitive materials can be machined by
- hot machining
  - explosive forming
  - electrical discharge machining \*
  - high velocity forming
  - magnetic pulse methods
2817. Ultrasonic machining finds application for
- production of tapped holes and threads in brittle materials
  - die casting
  - machining sintered carbides, diamonds etc.\*
  - all of the above
  - none of the above
2818. Tool is the case of ultrasonic machining is made of
- HSS
  - diamond
  - plain carbon
  - stainless steel
  - brass or copper \*
2819. In ultrasonic drilling process, the tool is usually given
- the rotary motion
  - the reciprocating motion \*
  - the linear motion
  - both the rotary motion and the reciprocating motion
  - no motion
2820. The electrodes used in the electro-chemical machining process must be made of
- semi-conductor
  - an anodic material
  - a dielectric
  - an insulating material
  - an electrically conducting material \*
2821. Ultrasonic machining method is best suited for
- brittle materials \*
  - stainless steel
  - plastics
  - lead
  - non-ferrous alloys
2822. The following non-conventional method of machining essentially requires electrolyte
- EDM \*
  - ECM
  - LBM
  - UTM
  - IBM
2823. A hole of 1 mm is to be drilled in glass. It could best be done by
- laser drilling
  - plasma arc drilling
  - ultrasonic method \*
  - electro-chemical discharge method
  - electron beam drilling
2824. The machining action in ultrasonic machining method is achieved by
- impact of tool on work piece
  - impact of tool on abrasive particles \*
  - impact of tool on coolant
  - abrasive
  - all of the above
2825. For mild steel work-piece and carbide tool, maximum material is removed at temperature of
- room temperature
  - 100°C
  - 280°C \*
  - 400°C
  - 500°C
2826. Which is false statement about plasma arc machining
- it is almost equally effective on any metal irrespectively of hardness
  - simple work supports required
  - metal removing rate can be increased by increasing the gas flow rate
  - metal properties remain even without shielding \*
  - can machine even refractory materials
2827. In electro-chemical machining, best surface finish is obtained
- with low current density
  - with high current density
  - with slow rate of metal removal
  - with high rate of metal removal \*
  - at all metal removal rates
2828. Chemical milling operation is carried out on
- grinder
  - milling machine
  - tank containing etching solution \*
  - surface table
  - special machine
2829. Following electrolyte is used in electrochemical machining process
- brine solution \*
  - kerosene
  - transformer oil
  - water
  - air
2830. For the machining of tungsten carbide by ultrasonic machining which abrasive is used for maximum machining rate ?
- silicon carbide
  - boron carbide \*
  - aluminium oxide
  - glass
  - carbon particles

2831. Electro-discharge machining uses the following dielectric fluid
- water
  - aqueous salt solution
  - sodium hydroxide
  - kerosene \*
  - lard oil
2832. Best coolant and lubricant for brass, copper, bronze and monel metal is
- water, soluble oils or sulphur-based mineral oils
  - mineral and fatty oils
  - soluble oil \*
  - dry
  - none of the above
2833. In iron beam machining process, the metal is removed by
- sputtering process \*
  - pulsed magnetic field
  - thermoelectric process
  - all of the above
  - none of the above
2834. The width of tape by which numerical control machines are controlled is
- 10mm
  - 20 mm \*
  - 25mm
  - 50mm
  - 100mm
2835. Number of tracks on tape as per EIA standard are
- 4
  - 6
  - 8 \*
  - 10
  - 12
2836. Photo-electric tape readers are capable of reading upto
- 10 rows/sec on tape
  - 100 rows/sec on tape
  - 300 rows/sec on tape \*
  - 3000 rows/sec on tape
  - none of the above
2837. A 'block' of information means
- one row on tape
  - a word, comprising several rows on tape
  - initial portion of tape
  - complete instruction \*
  - complete programming for a job
2838. TAB code is used
- to leave space between words
  - at the end of a block
  - to align the information properly on the type written copy \*
  - for starting fresh instruction
  - any one of the above
2839. The purpose of tumbling is to
- clean the surface of small parts \*
  - coat the surface
  - grind the surface
  - stress relieve the surface
  - increase fatigue resistance of surface
2840. Typical locating devices for cylindrical job used in jigs and fixture are
- drill jigs
  - V-blocks \*
  - mandrels
  - angle plates
  - metal pins
2841. The important property to be considered in the selection of a suitable material for the manufacturing of locating pins and drill jig bush used in jigs and fixtures is
- shear strength
  - tensile strength
  - elasticity
  - wear resistance \*
  - resilience
2842. The metal is subjected to mechanical working for
- refining grain size
  - reducing original block into desired shape
  - controlling the direction of flow lines
  - all of these \*
2843. The temperature at which the new grains are formed in the metal is called
- lower critical temperature
  - upper critical temperature
  - eutectic temperature
  - recrystallization temperature \*
2844. The recrystallisation temperature of steel is
- 400° C
  - 600° C
  - 800° \*
  - None of the above
2845. The hot working of metals is carried out
- at the recrystallisation temperature
  - below the recrystallisation temperature
  - above the recrystallisation temperature \*
  - at any temperature
2846. During hot working of metals
- porosity of the metal is largely eliminated
  - grain structure of the metal is refined
  - mechanical properties are improved due to refinement of grains
  - all of the above \*
2847. During hot working of metals
- poor surface finish is produced
  - scale is formed on the metal surface
  - close tolerances can not be maintained
  - all of these \*
2848. Which of the following methods can be used for manufacturing 2 metre long seamless metallic tubes ?
- Drawing
  - Extrusion
  - Rolling
  - Extrusion & rolling\*
2849. The process used to improve fatigue resistance of the metal by setting up compressive stresses in its surface
- hot piercing
  - extrusion
  - cold peening \*
  - cold heading

2850. The process extensively used for making bolts and nuts is  
 a. hot piercing                      b. extrusion  
 c. cold peening                      d. cold heading \*
2851. The process of increasing the cross-section of a bar at the expense of its length, is called  
 a. drawing down                      b. upsetting \*  
 c. spinning                              d. peening
2852. The process of decreasing the cross-section of a bar and increasing its length, is called  
 a. drawing down \*                      b. upsetting  
 c. spinning                              d. peening
2853. A moving mandrel is used in  
 a. wire drawing                      b. tube drawing  
 c. metal cutting                      d. forging \*
2854. Tandem drawing of wires and tubes is necessary because  
 a. it is not possible to reduce at one stage  
 b. annealing is needed between stages \*  
 c. accuracy in dimensions is not possible otherwise  
 d. surface finish improves after every drawing stage
2855. In order to get uniform thickness of the plate by rolling process, one provides  
 a. camber on the rolls                      b. offset on the rolls  
 c. hardening of the rolls \*                      d. antifriction bearings
2856. The dowels are  
 a. wooden nails \*                      b. box nails  
 c. wire nails                              d. none of these
2857. A pattern is used to make the mould cavity for pouring the molten metal for casting.  
 a. Yes \*                                      b. No
2858. Which of the following material can be used for making patterns ?  
 a. Aluminium                              b. Wax  
 c. Lead                                      d. all of these \*
2859. The ferrous metals require more machining allowance than non-ferrous metals.  
 a. True \*                                      b. False
2860. In die casting, machining allowance is  
 a. small                                      b. large  
 c. very large                              d. not provided \*
2861. In die casting, machining allowance is  
 a. red colour                              b. yellow colour  
 c. black colour \*                              d. blue colour
2862. The surface to be machined is marked on the pattern by  
 a. red colour \*                              b. yellow colour  
 c. black colour                              d. blue colour
2863. Swab is used for  
 a. smoothing and cleaning out depressions in the mould  
 b. cleaning the moulding sand  
 c. moistening the sand around the edge before removing pattern \*  
 d. reinforcement of sand in the top part of the moulding box
2864. A process used for making thin phosphate coating on steel is called parkerising  
 a. Right \*                                      b. Wrong
2865. Gears can be best produced on mass production by  
 a. shaping                                      b. casting  
 c. forming                                      d. hobbing \*
2866. Gear finishing operation is called  
 a. shaping                                      b. milling  
 c. hobbing                                      d. burnishing \*
2867. Gear burnishing is a process for  
 a. surface finishing \*  
 b. undercut gears  
 c. cycloidal gears  
 d. removing residual stresses from teeth roots
2868. Gear lapping is an operation  
 a. after heat treatment \*  
 b. prior to heat treatment  
 c. for gear reconditioning  
 d. none of these
2869. In gear hobbing  
 a. only hob rotates  
 b. only gear blank rotates  
 c. both hob and gear blank rotates \*  
 d. neither hob nor gear blank rotates
2870. While cutting helical gears on a non-differential gear hobber, the feed change gear ratio is  
 a. independent of index change gear ratio  
 b. dependent on speed change gear ratio  
 c. inter-related to index change gear ratio \*  
 d. independent of speed and index change gear ratio
2871. The purpose of jigs and fixtures is to  
 a. increase machining accuracy  
 b. facilitate interchangeability  
 c. decrease expenditure on quality control  
 d. all of these \*
2872. A jig is defined as a devices which  
 a. holds and locates a workpiece and guides and controls one or more cutting tools \*  
 b. holds and locates a workpiece during an inspection or for a manufacturing operation  
 c. is used to check the accuracy of workpiece  
 d. all of the above

2873. A fixture is defined as a device which
- holds and locates a workpiece and guides and controls one or more cutting tools
  - holds and locates a workpiece during an inspection or for a manufacturing operation \*
  - is used to check the accuracy of workpiece
  - all of the above
2874. Jigs are used
- for holding and guiding the tool in drilling, reaming or tapping operations \*
  - for holding the work in milling, grinding, planning or turning operations
  - to check the accuracy of workpiece
  - none of these
2875. Fixtures are used
- for holding and guiding the tool in drilling, reaming or tapping operations
  - for holding the work in milling, grinding, planning or turning operations \*
  - to check the accuracy of workpiece
  - none of the above
2876. A fixture does not guide the tool.
- Correct \*
  - Incorrect
2877. Jigs are heavier than fixtures in construction.
- Yes
  - No \*
2878. The floating position of the holding fixture in a rotary transfer device is used to
- improve the accuracy of location
  - reduce the tendency to over-index
  - improve upon the acceleration and deceleration characteristics
  - reduce the cycle time \*
2879. A diamond locating pin is used in jigs and fixtures because
- diamond is very hard and wear resistant
  - it occupies very little space
  - it helps in assembly with tolerance on centre distance \*
  - it has a long life
2880. If the diameter of the hole is subject to considerable variation, then for locating in jigs and fixtures, the pressure type of locator used is
- conical locator \*
  - cylindrical locator
  - diamond pin locator
  - vee locator
2881. In hot machining, solid carbide tools are preferred over high speed steel tools
- True \*
  - False
2882. In hot machining, the work is heated by
- simple heating
  - flame heating
  - induction heating
  - any one of these \*
2883. Which of the following statement is correct about hot machining ?
- It requires less power than machining metals at room temperature
  - The rate of tool wear is lower
  - It is used for machining high strength and high temperature resistant materials.
  - all of the above \*
2884. In ultra-sonic machining, the metal is removed by
- using abrasive slurry between the tool and work \*
  - direct contact of tool with the work
  - maintaining an electrolyte between the work and tool in a very small gap between the two
  - erosion caused by rapidly recurring spark discharges between the tool and work
2885. In electro chemical machining (ECM), the metal is removed by maintaining an electrolyte between the work and tool in a very small gap between the two.
- Agree \*
  - Disagree
2886. When the metal is removed by erosion caused by rapidly recurring spark discharge between the tool and work, the process is known as
- electro-chemical machining
  - electro-discharge machining \*
  - ultra-sonic machining
  - none of these
2887. The abrasive slurry used in ultra-sonic machining contains fine particles of
- aluminium oxide
  - boron carbide
  - silicon carbide
  - any one of these \*
2888. In hot machining, tool is made of
- tungsten carbide \*
  - brass or copper
  - diamond
  - stainless steel
2889. In ultra-sonic machining, tool is made of
- tungsten carbide
  - brass or copper \*
  - diamond
  - stainless steel
2890. Ultra-sonic machining is best suited for
- tool steels
  - sintered carbides
  - glass
  - all of these \*
2891. In electro-chemical machining, the gap between the tool and work is kept as
- 0.1 mm
  - 0.25 mm
  - 0.4 mm
  - 0.75 mm \*
2892. Which of the following statement is wrong about ultra-sonic machining ?
- It is best suited for machining hard and brittle materials.
  - It cuts materials at very slow speeds
  - It removes large amount of material \*
  - It produces good surface finish



2893. Dielectric is used in
- electro-chemical machining
  - ultra-sonic machining
  - electro-discharge machining \*
  - laser machining
2894. In electro-discharge machining, dielectric is used to
- help in the movement of the sparks
  - control the spark discharges
  - act as coolant
  - all of these \*
2895. In electro-discharge machining, tool is made of
- brass
  - copper
  - copper tungsten alloy
  - all of these \*
2896. In electro-discharge machining, the tool is connected to cathode.
- Correct \*
  - Incorrect
2897. Which of the following statement is correct about EDM machining ?
- It can machine hardest materials.
  - It produces high degree of surface finish
  - The tool and work are never in contact with each other.
  - all of these \*
2898. EDM machining is applied for
- shaping carbide dies and punches having complicated profiles
  - making large number of small holes in sieves and fuel nozzles
  - embossing and engraving on harder materials
  - all of these \*
2899. Buffing is
- A process of electroplating
  - Covering a metal part with soft materials to prevent damage
  - A finishing operation in broaching
  - The process of bringing out the luster of metal \*
  - An etching process.
2900. Burr is
- Unmachined portion of work piece
  - Boundary between finished and unfinished portion on a work piece
  - A marking or work piece to identify for correct position during assembly
  - Burnt surface of a casting
  - Sharp edge remaining on the metal after cutting, stamping or machining. \*
2901. A sprue hole is
- An eccentric hole
  - A blind hole
  - An opening in a mould into which the molten is poured \*
  - A through hole drilling through two mating parts
  - None of the above.
2902. Marform is
- A drawing process that forms metal sheet by using a movable steel punch and a rubber headed ram \*
  - Is a foming process on lathe in which movement of tool is neither governed by cross slide nor by compound slide
  - Is a forming tool and on lathe machine to generate spherical surfaces
  - A work holding device in which plane of rotation can be changed while working
  - Is a gauge used to check regular surfaces.
2903. The highest spindle speed for a small lathe is 1500 rpm. In order to obtain a suitable cutting speed for drilling some 3 mm holes in brass, drill head is mounted on the carriage, and driven in the opposite direction to the spindle. The speed at which drilling head be driven to give cutting speed of 72 metres per minute would be
- 1500 rpm
  - 3616 rpm
  - 5096 rpm
  - 6136 rpm \*
  - 7856 rpm.
2904. The change wheels for cutting a sparking plug thread ( $1\frac{5}{4}$  mm pitch) on a lathe with a 4 tpi lead screw and a set of wheels ranging from 20 T to 120 T in steps of 5 T Would be
- 20, 65, 50, 110 \*
  - 30, 55, 40, 110
  - 60, 30, 90, 45
  - 110, 40, 50, 45
  - 110, 50, 70, 35.
2905. International Prototype Meter is made of
- Cast iron
  - Mild steel
  - Copper
  - Copper-nickel alloy
  - Platinum-iridium alloy.\*
2906. Specific temperature for the international Prototype metre is
- Atmospheric
  - Melting point of ice
  - 0°C \*
  - 0°F
  - 0°K.
2907. Cold heading is a process of
- High energy rate forming
  - Explosive forming
  - Pneumatic mechanical forming
  - Electro-machining process
  - Chipless machining.\*
2908. Hard, tough, fragile and heat sensitive metals can be processed by
- Cold heading
  - Explosive forming
  - High energy rate forming
  - Electrical discharge machining \*
  - Intraform machining.
2909. Which one of the following is used for thermocouple junctions ?
- Elinvar
  - Manganin \*
  - Nichrome
  - Muntz metal
  - Duralumin.

2910. Heating elements for domestic and industrial electrical applications are made of
- Duralumin
  - Invar
  - Nichrome \*
  - Babbitt metal
  - Delta metal.
2911. Material used for resistances is generally
- Duralumin
  - Nichrome
  - Monel metal
  - Elinvar
  - Constantan.\*
2912. Bearing lining
- Bronze
  - Duralumin
  - Delta metal
  - Muntz metal
  - Babbitt.\*
2913. Solder contains
- Tin and silver
  - Silver and nickel
  - Nickel and lead
  - Lead and silver
  - Lead and tin.\*
2914. The hardness of martensite in quenched plain carbon steels reaches almost a saturation value of carbon of about
- 0.2 %
  - 0.4 %
  - 0.6 % \*
  - 1.4 %
  - None of the above.
2915. In ball bearing steels, chromium percentage is normally in the range
- 1 - 2 percent
  - 2 - 3 percent
  - 3 - 5 percent
  - 5 - 10 percent
  - 14 - 16 percent.\*
2916. A gear has a pitch diameter of 5.732 inches and circular pitch  $\frac{1}{2}$  inch. The angle in degrees subtended at the centre by one tooth would be
- 1°
  - 3°
  - 5° \*
  - 7°
  - 9°.
2917. The bonding of a rubber sheet with a metal is done by
- Welding
  - High frequency dielectric heating
  - Induction welding
  - Melting rubber in metal
  - Adhesive bonding.\*
2918. The surface roughness on a drawing is represented by
- Circle
  - Square
  - Zig-zag lines
  - Triangle \*
  - Curve.
2919. In automatic control systems a good control is
- One that is automatically controlled
  - One that gives maximum production
  - One that gives high operating efficiency
  - One that gives good results
  - One that has minimum deviation following a disturbance.\*
2920. In automatic control systems what could be the source of process disturbance
- Changes in supply
  - Changes in demand
  - Changes in environmental and other associated variables
  - Change in set point
  - Any of the above.\*
2921. The 'dead zone' in the control loop sensitivity
- Occurs when the control loop does not have input signal
  - Occurs when the control loop does not give output signal
  - Is the variation in the input signal for which there is no control system response \*
  - In the unit radiation on the input signal for which there is no control system response
  - None of the above.
2922. The advantage of a pneumatically operated control system is
- It can be used in hazardous atmosphere
  - Simplicity of components
  - Easily maintained
  - Relatively inexpensive
  - All of the above.\*
2923. The difference between a plate and sheet is
- A sheet is more than 5 mm in thickness
  - A plate is less than 5 mm in thickness
  - A sheet is always more than 5 metres in length
  - A sheet is always less than 5 mm thick and a plate more than 5 mm thick \*
  - Sheet and plate are same and thickness is immaterial.
2924. A strip is
- Same as sheet
  - Same as plate
  - A sheet less than 6 mm in thickness and 300 mm in width \*
  - A section other than rectangular
  - A cold rolled sheet.
2925. A foil is
- Same as sheet
  - Same as strip
  - A cold rolled sheet
  - A thin strip with maximum width 300 mm and a maximum thickness of 1.5 mm \*
  - None of the above.
2926. A Bourdon tube is generally made of
- Monel metal
  - Beryllium copper alloy
  - Phosphor bronze
  - Stainless steel
  - Any of the above.\*

2927. The transmission lag in mercury thermometers is generally
- Very high
  - High
  - Average
  - Low \*
  - Negligible.
2928. Out of the following materials which one is expected to have highest melting point ?
- Silver
  - Gold
  - Lead
  - Palladium
  - Tungsten.\*
2929. Out of the following materials which one will have lowest temperature of freezing ?
- Lead \*
  - Zinc
  - Gold
  - Copper
  - Tungsten.
2930. Resistance wire strain gauge works on the principle
- That resistance changes in proportion to strain on material
  - That resistance of wire changes with load
  - That conductivity is directly proportional to load on member
  - Due to elongation length increases and diameter reduces, thereby resistance changes \*
  - That the resistance of a wire is directly proportional to diameter and inversely proportional to length.
2931. The impedance of piezo-electric crystals is
- Negligible
  - Very low
  - Low
  - Average
  - High.\*
2932. Photoelectric transducers are used for the measurement of any phenomenon which can be used to produce
- Variation in current
  - Variation in voltage
  - Variation in light intensity \*
  - Variation in flux density
  - Any of the above.
2933. Some substances generate voltage when they are subjected to mechanical forces or stresses along specific planes. Such substances are known as
- Thermo-electric
  - Megneto-electric
  - Piezo-electric \*
  - Photoelectric
  - Radioactive.
2934. A photo- electric device in which the resistance of the metal changes directly proportional to the light striking on it is known as
- Photo-cell
  - Photo-emission
  - Photo-voltaic cell
  - Photo-conductive cell \*
  - None of the above.
2935. Scale sensitivity is defined as
- Ratio of a change in scale reading to the corresponding change in pointer deflection \*
  - Least reading of scale/range of scale
  - Least reading of scale/unit measurable quantity
  - Least count of scale/range of scale
  - None of the above.
2936. Thermocouples are generally used for accurate temperature measurement upto
- 100° C
  - 200° C
  - 500° C
  - 1000° C
  - 1600° C.\*
2937. The commonly used material for thermocouple is
- Chromel - copper
  - Chromel - alumel
  - Platinum - rhodium
  - Any of the above \*
  - None of the above.
2938. For the measurement of temperature the transduction method could be
- Electron tube
  - Inductive
  - Capacitive
  - Piezo-electric
  - Resistance.\*
2939. The primary detector in a pressure gauge is usually
- Bellows
  - Diaphragm
  - Spring
  - Coil spring
  - Bourdon tube.\*
2940. For the measurement of pressure of liquids at high temperature using pressure gauge
- Necessary correction factor is applied
  - Gauge is heated to the temperature to be measured
  - A siphon filled with liquid is used to protect the Bourdon tube \*
  - Necessary thermodynamic calculations are made
  - Pressure gauge is never used in such cases.
2941. For defining length the standard generally followed is
- Bar standard
  - End standard
  - Light wave standard
  - Any of the above \*
  - None of the above.
2942. The fact that how closely the instrument reading follows the measured variables is termed as
- Fidelity \*
  - Accuracy
  - Threshold sensitivity
  - Precision
  - Hysteresis.
2943. Mechanical seals are used
- To prevent vibrations
  - To prevent leakage \*
  - To reduce friction
  - To balance the equipment
  - None of the above.

2944. All mechanical seals have two flat sealing surfaces
- At right angles to the axis of rotation \*
  - Parallel to the axis of rotation
  - Parallel to the end plate
  - None of the above.
2945. In a water pump the seals are cooled by
- A special built in arrangement
  - Water being pumped \*
  - Surrounding air
  - None of the above.
2946. In a stationary type mechanical seal the sealing ring is generally located
- In machine housing \*
  - Along machine shaft
  - Independently
  - None of the above.
2947. The percentage of carbon that must be present in steel before it can be hardened noticeably is
- 0.05 percent
  - 0.10 percent
  - 0.20 percent \*
  - 0.30 percent
  - 0.70 percent.
2948. Which of the following operation is not involved in heat treatment of steels
- Normalizing
  - Annealing
  - Tumbling \*
  - Strain drawing
  - Cyaniding.
2949. If a piece of steel is reheated to a temperature of  $200^{\circ}\text{C}$  to  $250^{\circ}\text{C}$  immediately after quenching, the process is known as
- Tempering \*
  - Hardening
  - Annealing
  - Normalizing.
2950. Steel balls are required in large quantities. Which process would you select for the manufacture ?
- Turning on a lathe
  - Turning on a capstan or Turret lathe
  - Turning on a automatic lathe
  - Cold heading \*
  - Casting.
2951. The process of bringing out the lustre of metal usually by the use of cloth wheels is known as
- Buffing \*
  - Burnishing
  - Finishing
  - Deburring
  - Carbide.
2952. Coated tools are good at
- reducing machining cost
  - increasing surface finish on scoled surfaces
  - reducing diffusion wear \*
  - None of the above.
2953. The pieces of material that are removed when punching holes in tape are known as
- Burrs
  - Circles
  - Clad \*
  - Fillings
  - Cermets.
2954. Cyaniding
- A process of case hardening \*
  - A process of annealing a ferrous alloy
  - A process of hardening and tempering
  - A process used on non-ferrous materials for improving surface quantities
  - A process of removing carbon from metals.
2955. A process applying oxide coating on aluminium is known as
- Oxidizing
  - Galvanising
  - Pickering
  - Anodizing \*
  - Blanking.
2956. The Roman notation DCCCC represents
- 90
  - 900 \*
  - 340.
  - 440
  - 140.
2957. Which of the following is not a squeezing process ?
- Coining
  - Riveting
  - Trimming \*
  - Thread rolling
  - Knurling.
2958. Which of the following is not a shearing process ?
- Lancing
  - Embossing \*
  - Notching
  - Blanking
  - Perforating.
2959. Which of the following is not a 'drawing' process ?
- Tube drawing
  - Lancing \*
  - Spinning
  - Embossing
  - Bulging.
2960. With increasing cutting velocity total time for machining a component
- decreases
  - increases
  - first decreases and then increases \*
  - none of the above.
2961. Which of the following test can be used to detect surface cracks in the welding of non-magnetic alloys?
- Fluorescent test \*
  - Gamma ray test
  - X-ray test
  - Magnaflux test
  - Any of the above.
2962. Wipping is the process of
- Cleaning the welded surface after the welding operation is over
  - Applying flux during welding process
  - Connecting load pipes by soldering alloy \*
  - Low temperature welding
  - None of the above.

2963. Which of the following is a chipless machining process ?
- Metal spinning \*
  - Knurling
  - Hobbing
  - Lapping
  - None of the above.
2964. Which of the following is not a chipless machining process ?
- Cold heading
  - Extruding
  - Rolling
  - Grinding \*
  - Die casting.
2965. Ultrasonic machine is best suited for
- Non-ferrous metal
  - Amorphous solids
  - Brittle materials \*
  - Dielectrics
  - Spongy materials.
2966. In which of the following machining process thermoelectric energy is used for machining operations ?
- Ion beam machining
  - Electro discharge machining
  - Laser beam machining
  - Electro beam machining
  - All of the above.\*
2967. Which surfaces are usually 'wrung' together ?
- Gears
  - Threads
  - Drill shanks and collets
  - Bed guides for lathe
  - Slip gauges.\*
2968. Which of the following is an interference fit ?
- Running fit
  - Sliding fit
  - Push fit
  - Light keying fit
  - Shrink fit.\*
2969. Which of the following is a clearance fit ?
- Push fit
  - Sliding fit \*
  - Press fit
  - Driving fit
  - Force fit.
2970. Shearing strain in the chip at shear plane is
- $\tan(\phi - \alpha) + \cot \phi$  \*
  - $\tan(\phi - \alpha) + \tan \phi$
  - $\tan(\phi + \alpha) + \cot \phi$
  - $\tan(\phi - \alpha) - \tan \phi$ .
2971. Stellite is a non-ferrous cast alloy containing
- Tungsten, chromium and cobalt \*
  - Cobalt and manganese
  - Molybdenum and vanadium
  - Nickel, cobalt and chromium
  - Nickel, lead and zinc.
2972. Extrusion is the process of
- Producing holes by arc
  - Marking cup shaped articles using the force of explosion
  - Pushing the heated billet of metal through the orifice \*
  - Metal shaping on presses
  - Welding two dissimilar metals.
2973. The operation of cutting holes in sheet by a press is known as
- Drilling
  - Slitting
  - Punching \*
  - Trimming
  - Shearing.
2974. Which of the following defect in castings is caused by the molten metal ?
- Scab
  - Swell \*
  - Shrinkage
  - Blowholes
  - All of the above.
2975. Which of the following is not a fine finishing operation?
- Tumbling \*
  - Grinding
  - Honing
  - Lapping
  - Buffing.
2976. Plug rolling is used to
- Remove out of roundness of pipes
  - Cut threads at the ends of pipes
  - Increase the wall thickness of pipes at ends
  - Reduce the diameter of pipe
  - Reduce the wall thickness and increase the diameter of tubes already made.\*
2977. A process of zinc diffusion is known as
- Anodising
  - Brazing
  - Metallizing
  - Sherardizing \*
  - Sintering.
2978. The thickness of clearance can be checked by
- Snap gauge
  - Ring gauge
  - Go and not go gauge
  - Feeler gauge \*
  - Any of the above.
2979. Which of the following is basically polishing operation ?
- Soft grinding
  - Lapping
  - Honing
  - Buffing.\*
2980. Which of the following is not an abrading process ?
- Honing
  - Lapping
  - Tumbling \*
  - Grinding.
2981. Honing is used to
- correct ovality
  - waviness of axis
  - non-parallelism of cylindrical features
  - all of the above.\*
2982. Hardness of work surface affects honing by
- varying the rate of stock removal \*
  - poor surface finish
  - a coolant consumption
  - all of the above.
2983. All of the following are metal cleaning methods EXCEPT:
- Tumbling
  - Knurling \*
  - Phosphatizing
  - Abrasion blasting.

2984. Hardness tester used for determining the hardness of a core is nearly identical to which of the following?
- Brinell hardness tester \*
  - Vickers hardness tester
  - Rockwell hardness tester
  - Shore's scleroscope.
2985. Presence of oxygen in copper
- makes it harder \*
  - gives it yellow colour
  - generates blisters on the surface
  - increases electrical conductivity.
2986. Austenitic stainless steel contain
- at least 24 percent of combined chromium and nickel \*
  - 4 to 6 percent of chromium
  - chromium which is 17 times the percentage of carbon
  - none of the above.
2987. The tool used for punching small indentations/ establishing points for divider is termed as
- Prick punch \*
  - Solid punch
  - Hollow punch.
2988. Fig. 10.11 shows the dimension obtained on a component by a certain instrument  
This instrument is

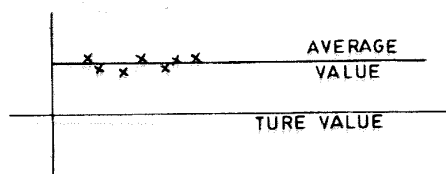


Fig. 10.11.

- precise but not accurate \*
  - accurate but not precise
  - both accurate and precise
  - neither precise nor accurate
  - sensitive
2989. The maximum amount by which the result differs from the true value is called
- correction
  - discrepancy
  - error
  - accuracy \*
  - uncertainty
2990. Which of the following errors are inevitable in the measuring system and it would be vainful exercise to avoid them
- systematic errors
  - random errors \*
  - calibration errors
  - environmental errors
  - deformation errors
2991. Which of the following refers to parasitic error
- Error, often gross, which results from incorrect execution of measurement \*
  - algebraic difference between the results of measurement and the value of comparison
  - error which varies in an unpredictable manner in absolute value and in sign when a large number of quantity are made under practically identical conditions
  - disagreement between the result of measurement and the value of the quantity measured
  - error which during several measurements, under the same conditions of the same value of a certain quantity, remains constant in absolute value and sign or varies in accordance with a specified law when the conditions change
2992. Which of the following characterises the dispersion of the results obtained in a series of measurements of the same value of a quantity measured
- absolute error
  - relative error
  - root mean square deviation \*
  - uncertainty of measurement
  - variation of indication
2993. Instrument which is designed to eliminate the personal element of feel when setting a measuring instrument is called
- fiducial indicator \*
  - zero setting device
  - auxiliary measuring instruments
  - measuring standard
  - indicating element
2994. The axis of measurement of the scale or other dimensional reference should coincide. This principle is called the
- principle of kinematic design
  - principle of alignment \*
  - principle of linear measuring instruments
  - principle of collinearity
  - principle of location and movement
2995. Pick out the wrong statement about flexible strips
- these are used in instruments where small movements are required between component parts
  - no force or torque is required to displace a member located on flexible strip from its mid position \*
  - it has no friction or backlash
  - it is not subjected to wear
  - it has negligible hysteresis
2996. Fig. 10.12 shows a case of error in relative location of surfaces. This case is for
- misalignment
  - axial runout
  - radial runout \*
  - non parallelism of axes
  - squareness error



Fig.10.12

2997. The M-and E-system in metrology are related with measurement of

- a. gears
- b. screw threads
- c. flatness
- d. angularity
- e. surface finish \*

2998. The cross section of International Prototype Meter is shown in (Refer Fig. 10.13)

- a. Figure A
- b. Figure B
- c. Figure C
- d. Figure D
- e. Figure E \*

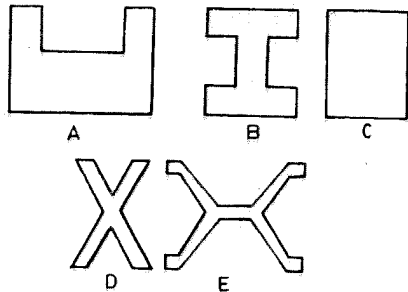


Fig.10.13.

2999. The term traceability in Engineering Metrology is concerned with

- a. measuring machines
- b. optical instruments
- c. pneumatic comparator
- d. standards \*
- e. limits and fits

3000. In selective assembly

- a. parts in an assembly can be replaced by a similar part without any further alteration
- b. parts are produced on hole basis system
- c. all the parts are always interchangeable
- d. the size of one of the components is measured accurately and then mating component is made to match with this
- e. the parts of any one type are classified into several groups according to size \*

3001. According to well accepted practice, slip gauges which have been handled for a few minutes should be left for sometimes. The reason for this could be

- a. the moisture transferred from hand would evaporate
- b. the structure of gauges, if disturbed would evaporate
- c. gauges attain the room temperature again \*
- d. with continuous use, gauges may wear quickly
- e. there is no such practice

3002. Which of the following is not the essential requirement for accuracy of measurement with a sine bar

- a. flatness of upper surface
- b. equality of size and roundness of rollers
- c. exact distance between roller axes and mutual parallelism
- d. parallelism between top and bottom surfaces \*
- e. parallelism of rollers to upper surface and equality of axis distance as from surface

3003. Error of measuring equipment is

- a. the closeness with which a measurement can be read directly from a measuring instrument
- b. a measure of how close the reading is to the true size
- c. the difference between measured value and actual value \*
- d. the smallest change in measurand that can be measured
- e. the capability to indicate the same reading again and again for a given measurand

3004. Fiducial indicators contain

- a. calibrated scale
- b. a single index mark \*
- c. micrometer screw movement
- d. optical head
- e. interferometric devices

3005. A comparator for its working depends on

- a. accurately calibrated scale
- b. comparison with standard such as slip gauges \*
- c. accurate micrometer gauge
- d. optical devices
- e. determining zero error of scale correctly

3006. The term "Allowance" in limits and fits is usually referred to

- a. minimum clearance between shaft and hole \*
- b. maximum clearance between shaft and hole
- c. difference of tolerances of hole and shaft
- d. difference between maximum size and minimum size of the hole
- e. difference between maximum size and minimum size of the shaft

3007. Which of the following is the correct way of designating fit

- a.  $H_8 / g_7$
- b.  $g_7 / H_8$
- c.  $50 H_8 / g_7$  \*
- d.  $H_8 / g_7 - 50$
- e.  $50 H_8 / 50 h_7$

3008. Drilled holes, and honed holes, could be designated by following grades respectively

- a.  $H_5, H_{11}$
- b.  $H_6, H_{10}$
- c.  $H_8, H_6$
- d.  $H_{10}, H_8$  \*
- e.  $H_{11}, H_8$

3009. The standard tolerance unit I in the case of limits and fits for sizes above 500 mm and upto 3150 mm is

- a.  $0.45 \left(\sqrt[3]{D}\right) + 0.001 D$
- b.  $0.52 \left(\sqrt[3]{D}\right) + 0.001 D$
- c.  $0.30 \left(\sqrt[3]{D}\right) + 0.042 D$
- d.  $0.005 \left(\sqrt[3]{D}\right)$
- e.  $0.004 D + 2.1 (D \text{ is in mm}) *$

3010. Sensitivity of measuring equipment is

- a. the closeness with which a measurement can be read directly from a measuring instrument
- b. a measure of how close the reading is to the true size
- c. the difference between measured value and actual value
- d. the smallest between measurand that can be measured \*
- e. the capability to indicate the same reading again and again for a given measurand

3011. Newall system of limits and fits is the oldest system working on hole basis system. The grades of holes and shafts specified respectively are

- a. 2, 6 \*
- b. 1, 8
- c. 4, 12
- d. 6, 20
- e. 8, 26

3012. ISA tolerance system consists of following numbers of qualities of tolerance and grades of fit respectively

- a. 6, 15
- b. 8, 20
- c. 12, 21
- d. 16, 21\*
- e. 21, 26

3013. Expressing a dimension as  $25.3^{+0.05}$  mm is the case of

- a. unilateral tolerance
- b. bilateral tolerance \*
- c. limiting dimensions
- d. all of the above
- e. none of the above

3014. Surface roughness on a drawing is represented by

- a. triangles \*
- b. circles
- c. squares
- d. rectangles
- e. none of the above

3015. Expressing a dimension as 32.5/32.3 mm is the case of

- a. unilateral tolerance
- b. bilateral tolerance
- c. limiting dimension \*
- d. all of the above
- e. none of the above

3016. A bore of 14.67 mm in a workpiece can be measured by

- a. steel rule
- b. vernier caliper
- c. pneumatic gauge
- d. micrometer \*
- e. plug gauge

3017. In Figure 10.14, size A refers to

- a. lower deviation
- b. minimum interference
- c. minimum clearance \*
- d. maximum clearance
- e. maximum transition

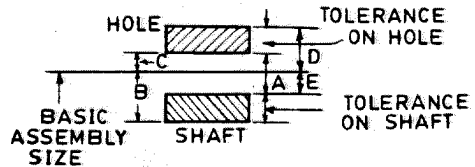


Fig.10.14.

3018. In Figure 10.14, sizes B and C refer to

- a. lower deviation \*
- b. upper deviation
- c. maximum clearance
- d. minimum clearance
- e. minimum allowance

3019. In Figure 10.14, sizes D and E refer to

- a. lower deviation
- b. upper deviation \*
- c. maximum clearance
- d. minimum clearance
- e. minimum allowance

3020. The diameter of finish turned shaft can best be checked with a

- a. combination set
- b. slip gauge
- c. height gauge
- d. micrometer screw gauge \*
- e. dial indicator

3021. One micron is equal to

- a. 1 mm
- b. 0.1 mm
- c. 0.01 mm
- d. 0.001 mm \*
- e. 0.0001 mm

3022. In Figure 10.15, which of the combination of hole and shaft represents hole basis system

- a. A \*
- b. B
- c. C
- d. D
- e. none of the above

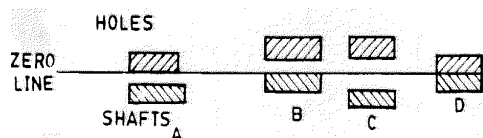


Fig.10.15.



3023. In Figure 10.16 which of the following combination represents interference fit
- A
  - B
  - C
  - D
  - E \*

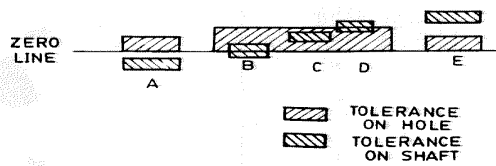


Fig.10.16.

3024. Accurate centring of work mounted in an independent chuck can be determined by using a
- centre gauge
  - height gauge
  - dial indicator \*
  - surface gauge
  - micrometer
3025. In limits and fits system, basic shaft system is one whose
- lower deviation is zero
  - upper deviation is zero \*
  - minimum clearance is zero
  - maximum clearance zero
  - standard tolerance is zero
3026. Which of the following is not the angle measuring device
- angle plate \*
  - sine bar
  - bevel protector
  - angle gauge
  - combination square
3027. To check the diameter of a twist drill with a micrometer, the measurement must be taken across the
- margins of the drills \*
  - flutes of the drill
  - cutting edges of the drill
  - lips of the drill
  - web of the drill
3028. Pick out the wrong statement
- The Go screw plug is made to the minimum metal limit and of full form and checks the virtual effective diameter. Any error in the pitch or flank angle of screw affects the effective diameter
  - The minimum limit of the major diameter and maximum size of the effective diameter are also checked
  - Not Go screw plug gauge is made to the maximum effective diameter of the screw thread cleared at the root and crest
  - The plain Go and Not Go gauges are used for checking the limits of the size of minor diameter
  - The dimensions of Go and Not Go gauges correspond to maximum and minimum minor diameters \*

3029. Expressing a dimension as  $18.3_{-0.02}^{+0.00}$  mm is the case of
- unilateral tolerance \*
  - bilateral tolerance
  - limiting dimensions
  - all of the above
  - none of the above
3030. In instrumentation a correction is
- an error
  - the revision applied to the indicated value so that the final result obtained improves the worth of the result \*
  - reading error
  - range of error-degree of correctness
  - lowest value of input which does not indicate the result
3031. Many external comparators have anvils or work tables which are grooved. The purpose of this is to
- facilitate supporting of work
  - provide three point support to the work
  - not to pass on inaccuracy of surface to the measurement
  - trap any dirt on the table so that it does not interfere with the measurement \*
  - avoid sticking of standards on the table
3032. Straight edges are used to measure
- straight length of parts
  - flatness \*
  - parallelism
  - perpendicularity
  - circularity
3033. IS : 919 on limits and fits specifies following numbers of grades of fundamental tolerances and fundamental deviations respectively
- 25, 18
  - 25, 16
  - 18, 22
  - 18, 25 \*
  - 18, 20
3034. For general use the measuring tip of a comparator should be
- flat
  - spherical \*
  - conical
  - concave
  - grooved
3035. Basic shaft and basic hole are those whose upper deviations and lower deviation respectively are
- + ve, - ve
  - ve, + ve
  - minimum, minimum
  - minimum, maximum
  - zero, zero \*

3036. The standard tolerance unit is equal to
- $0.45 \left(\sqrt[3]{D}\right) + 0.001 D^*$
  - $0.45 \left(\sqrt[3]{D}\right) + 0.01 D$
  - $0.45 \left(\sqrt[4]{D}\right) + 0.01 D$
  - $0.45 \left(\sqrt[3]{D}\right)$
- where  $D$  = geometric means of the lower and upper diameters of a particular diameter step
3037. Eden-Rolt comparator is a popular instrument for me
- calibration of slip gauges \*
  - absolute measurement of length of slip gauges
  - measurement of flatness
  - measurement of angles
  - measurement of linear movement
3038. It is desirable to handle the slip gauges with a cloth or chamois leather in order to
- avoid injury to hands
  - protect the surfaces of slip gauges
  - insulate them from the heat of the hand \*
  - ensure that the varnish applied on gauges does not come out
  - none of the above
3039. For grades IT 7, value of tolerance is equal to
- 7i
  - 10i
  - 16i \*
  - 25i
  - 40i
3040. For defining length the standard generally followed is
- bar standard
  - end standard
  - light wave standard
  - any one of the above \*
  - none of the above
3041. Airy points of support are
- 0.577 L apart \*
  - 0.554 L apart
  - 0.5 L apart
  - 0.58 L apart
  - 0.612 L apart
- Where  $L$  = length of bar
3042. The maximum number of faces in precision polygons can be
- 6
  - 8
  - 12
  - 20
  - 72 \*
3043. In precision polygon, a central hole and small holes are drilled through the thickness
- for mounting purpose \*
  - to achieve high accuracy
  - for ease of manufacture
  - to make them light
  - for decoration
3044. Precision polygons are calibrated from first principles using
- one autocollimator
  - two autocollimators \*
  - three autocollimators
  - two precision spirit levels
  - angle gauges
3045. The fact that how closely the instrument reading follows the measured variables is termed as
- fidelity \*
  - accuracy
  - threshold sensitivity
  - precision
  - hysteresis
3046. The long straight edges are supported at two points for minimum deflection at centre. The distance between supports compared to the length of straight edge should be
- 0.5
  - 0.554 \*
  - 0.577
  - 0.6
  - 0.677
3047. Pick up the correct statement. A comparator
- needs to be calibrated \*
  - need not be calibrated
  - contains a calibrated scale
  - is highly accurate over its complete measuring range
  - is best suited for measurement of absolute dimensions
3048. Which of the following is the essential condition for interferometry measurement
- an air gap (a wedge) of varying thickness must exist between the two surfaces
  - an optical flat is required
  - the work surface must be reflective
  - monochromatic source of light is required
  - all of the above \*
3049. The correct relationship for pneumatic comparator in Figure 10.17 is represented by
- Curve A
  - Curve B
  - Curve C
  - Curve D \*
  - none of the above

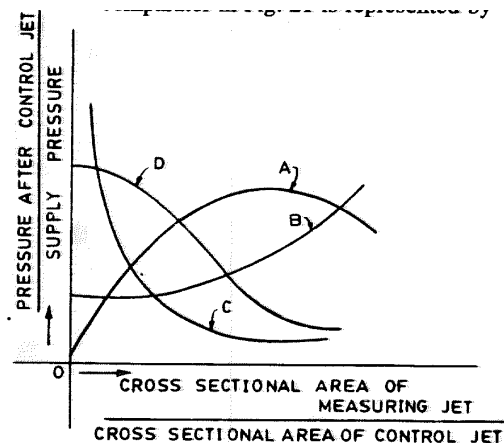


Fig.10.17

3050. Figure 10.18 shows
- pneumatic comparator
  - flatness tester
  - fluid gauge or hydraulic comparator \*
  - level gauge
  - manometer

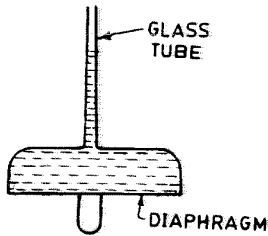


Fig.10.18.

3051. If the fringe pattern on an optical flat is as shown in Figure 10.19, the surface under flat
- Perfectly flat
  - Cylindrical
  - Spherical
  - Ridge or Valley \*
  - Convex

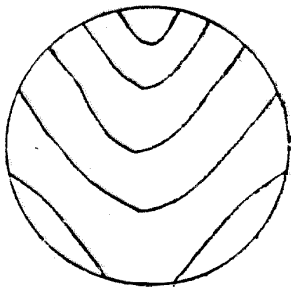


Fig.10.19.

3052. Some substances generate voltage when they are subjected to mechanical forces or stresses along specific planes. Such substances are known as (Refer Fig 10.20)

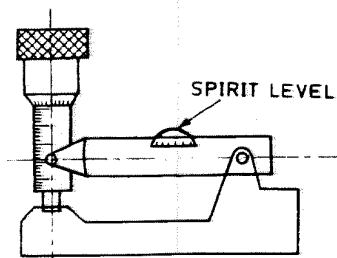


Fig.10.20.

- thermo-electric
- magneto-electric
- piezo-electric \*
- photo-electric
- radio-active

3053. Figure 10.21 shows the following type of interferometer
- NPL gauge interferometer
  - Michelson interferometer
  - Twyman-Green modified Michelson interferometer
  - Farby-Perot interferometer
  - Kosters gauge interferometer \*

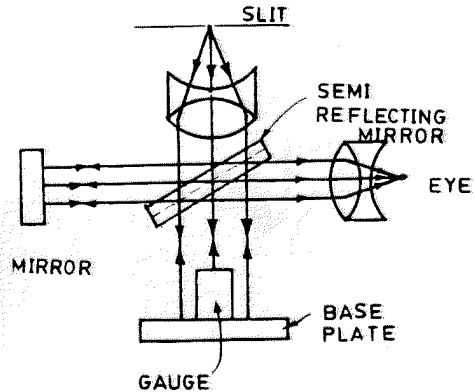


Fig.10.21.

3054. The only natural material producing a spectral line (6440<sup>o</sup> A red) almost completely symmetrical is
- Cadmium \*
  - Mercury
  - Krypton
  - Helium
  - Neon

3055. A photo-electric device in which the resistance of the metal changes directly proportional to the light striking on it, is known as
- photo-cell
  - photo-emission cell
  - photo-voltaic cell
  - photo conductive cell \*
  - none of the above

3056. Which of the following is not the correct method of specifying numerical value of surface roughness
- Centre-line average (CLA) value
  - mean-line and envelop line systems \*
  - r.m.s. value
  - peak-to-valley height
  - roughness characteristic like depth of smoothness, mean depth etc.

3057. Figure 10.22 shows the roughness characteristics of a surface. Distances A and B represent
- CLA values
  - peak to valley height
  - depth of smoothness and mean depth respectively \*
  - mean depth and depth of smoothness respectively
  - fullness grade and emptiness grade respectively

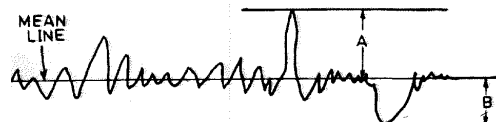


Fig.10.22.

3058. The primary texture or roughness or micro-errors on surface results due to
- normal action of the tool on production process \*
  - vibrations and non-uniformity of cutting process
  - flaws in material
  - dominant direction of tool marks (lay)
  - all of the above
3059. The function of a transducer is
- to amplify the input signal
  - to modify the input signal
  - to convert the primary signal into a more useful quantity usually an electrical impulse \*
  - to codify the input signal
  - to decodify the input signal
3060. Pick up the correct statement in connection with surface finish
- Pitch of secondary texture is same as pitch of primary texture
  - Pitch of secondary texture is more than pitch of primary texture \*
  - Pitch of secondary texture is less than pitch of primary texture
  - Pitch of primary and secondary texture can't have any relationship
  - Pitch of primary and secondary textures is related mathematically
3061. If graduations on beam of a vernier gauge are marked at every 1/2 mm and 10 divisions on vernier scale are on a distance of 9.5 mm, then least count is
- 0.1 mm
  - 0.05 mm \*
  - 0.01 mm
  - 0.02 mm
  - 0.005 mm
3062. Scale sensitivity is defined as
- Ratio of a change in scale reading to corresponding change on pointer deflection \*
  - Least reading of scale/range of scale
  - Least reading of scale/unit measurement quantity
  - Least count of scale/range of scale
  - none of the above
3063. A three-lobed part if checked on  $60^\circ$  V-block would provide following magnification of the radial out-of-round characteristics
- |              |            |
|--------------|------------|
| a. 1 time    | b. 2 times |
| c. 3 times * | d. 4 times |
| e. 5 times   |            |
3064. A five-lobed part, if gauged in the  $60^\circ$  V block would produce the following magnification of the radial out-of-round characteristics
- |             |            |
|-------------|------------|
| a. 0 time * | b. 1 time  |
| c. 2 times  | d. 3 times |
| e. 5 times  |            |
3065. Diametral gauging for out-of-roundness measurement is not sufficient because
- it can't sense even lobed parts
  - radial changes always occur which can't be sensed by it \*
  - it is difficult to find true centre
  - its readings can't be fed to computer
  - it provides measurement at 2 points only
3066. The 'best size wire' for measuring the effective diameter of threads is of thread
- $\frac{p \sec \theta}{2}$  \*
  - $\frac{p \cos \theta}{2}$
  - $P \sec \theta$
  - $2p \sec \theta$
  - $\frac{p \sec \theta}{4}$
- where  $p$  = pitch of thread,  $\theta$  = semi-angle of thread
3067. Gratings are used in connection with
- flatness measurement
  - roundness measurement
  - surface texture measurement
  - convexity/concavity measurement
  - linear displacement measurements \*
3068. The method of fractional coincidences in interferometry techniques is used for
- Measurement of end gauges \*
  - flatness of surface
  - linear displacement measurements
  - convexity/concavity of surfaces
  - surface roughness measurements
3069. Involute function of a gear is defined as
- $(\cos \alpha - \alpha)$  radians
  - $(\sin \alpha - \alpha)$  radians
  - $(\tan \alpha - \alpha)$  radians \*
  - $(\cot \alpha - \alpha)$  radians
  - $(\sec \alpha - \alpha)$  radians
3070. The pitch circle radius  $r_p$  and base circle radius  $r_b$  of a gear are related by the following relationship ( $\alpha$  = pressure angle)
- $r_b = r_p \cos \alpha$  \*
  - $r_b = \frac{r_p}{\cos \alpha}$
  - $r_b = r_p \sin \alpha$
  - $r_b = r_p \tan \alpha$
  - $r_b = r_p (\tan \alpha - \alpha)$

3071. The diameter of a large bore is measured by rocking a pin gauge in it as shown in Figure 10.23. If  $L$  be length of pin, and  $2l$  the swing, then diameter  $D$  is nearly equal to

- a.  $L + \frac{l^2}{2L}$  \*                      b.  $L + \frac{l^2}{L}$   
 c.  $L + \frac{l^2}{4L}$                         d.  $L + \frac{l^2}{8L}$   
 e.  $L + \frac{l^2}{3L}$

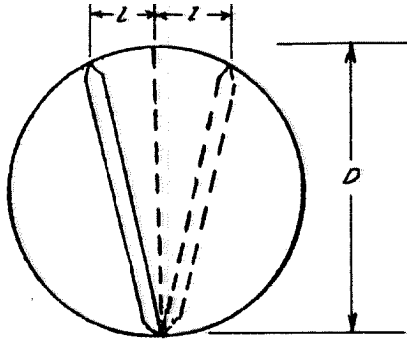


Fig.10.23.

3072. The undercutting in case of  $14\frac{1}{2}$  degree full depth involute teeth occurs when the number of teeth is less than

a. 10  
 b. 16  
 c. 18  
 d. 25  
 e. 32 \*

3073. During the gear tooth cutting operation the undercutting may occur, due to the corners of the cutter biting into the true involute curve on the flank of the tooth. This is called interference. It can be avoided by

a. increasing the addendum on the pinion and reducing on the gear wheel \*  
 b. increasing the addendum on both pinion and gear wheel  
 c. reducing the addendum on both pinion and gear wheel  
 d. reducing the addendum on the pinion and increasing on the gear wheel  
 e. none of the above

3074. The normal chordal tooth thickness of a gear is the shortest distance from the

a. tooth crest to the point of the chord  
 b. tooth crest to the mid point of the chord \*  
 c. mid point tooth crest to any point on the chord  
 d. from the tooth crest to any point on the chord  
 e. mid point of the constant chord to tip of the tooth

3075. Addendum of a gear is equal to

a. Pitch  $p$                               b.  $0.3 p$   
 c.  $0.3183 p$  \*                            d.  $0.3683 p$   
 e.  $0.6866 p$

3076. In the phenomenon of optical interference, the two beams of light, both originating from the same source, can cause interference patterns when the path difference between them amounts to

a. 1 micron  
 b. 1 mm  
 c. one wavelength of the light being used  
 d. an odd half-wave length of the light being used \*  
 e. an even half-wave length of the light being used

3077. The NPL gauge Interferometer is designed and used for

a. absolute measurement of length of slip gauges \*  
 b. judging flatness of surface  
 c. comparing height with a standard reference  
 d. measurement of fringe displacement  
 e. parallelism of two ends if slip gauge

3078. Taylor's principle is concerned with

a. pneumatic comparators  
 b. interferometric measurements  
 c. gauging measurements \*  
 d. angular measurements  
 e. roundness measurements

3079. The radius of curvature of tube in precise spirit level is of the order of

a. 10 cm                                      b. 50 cm  
 c. 1 m                                         d. 10 cm  
 e. 50 m \*

3080. Profile of a gear tooth is to be checked. Which one of the following device would you choose

a. optical pyrometer  
 b. bench micrometer  
 c. sine bar  
 d. telescopic gauge  
 e. optical projector \*

3081. In which of the following inspection system, the inspection keeps pace with the production

a. sampling inspection  
 b. cent percent inspection  
 c. centralised inspection \*  
 d. centralised inspection  
 e. floor or patrol inspection

3082. In inspection by attributes

a. good quantities are separated from bad \*  
 b. quality under consideration is measured on some scale expressing it quantitatively  
 c. variations due to assignable factors are determined  
 d. variations due to chance factors are determined  
 e. theory of probability is applicable

3083. The square of the standard deviation is also called
- skewness
  - variance \*
  - medium
  - mode
  - range

3084. In an interferometer experiment, following pattern of fringes was observed. The surface being tested is (Refer fig 10.24)
- flat
  - convex
  - concave
  - ridge/valley in the middle
  - smooth cylindrical surface \*

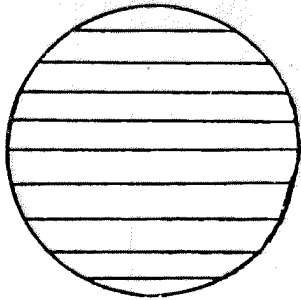


Fig.10.24.

3085. If the interference bands with optical flat are as shown in Figure 10.25, the surface would be
- convex \*
  - concave
  - ridge
  - progressively convex
  - uneven

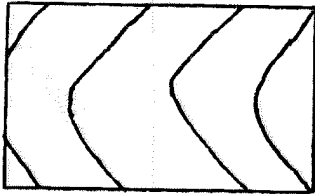


Fig 10.25.

3086. A scale in which the distance between graduations is proportional to the value of that graduation is called
- equidistant scale
  - regular scale
  - linear scale \*
  - scale with a constant value of graduation
  - non-linear scale

3087. Coefficient of variation in terms of standard deviation is defined as

- $\sigma^2 \times 100$
- $\sqrt{\sigma} \times 100$
- $\frac{\sigma}{\bar{X}} \times 100$  \*
- $\frac{\sigma}{R} \times 100$
- $\pm 3\sigma \times 100$

( $\bar{X}$  and R represent mean value and range respectively).

3088. Profilometer is an instrument used to measure
- gear involute
  - thread profile
  - taper
  - surface roughness \*
  - surface flatness

3089. Variance is defined as

- $\frac{\sigma}{2}$
- $\pm 3\sigma$
- $\sqrt{\sigma}$
- $\sigma^2$  \*
- $\frac{\sigma}{\bar{X}}$

( $\sigma$  = standard deviation and  $\bar{X}$  = mean value)

3090. The value of a set of data at which the greatest number of cases is concentrated is called

- mean
- median
- range
- standard deviation
- mode \*

3091. If the correctness of profile of a thread is to be checked, which instrument would you choose

- bench micrometer
- screw pitch gauge
- sine bar
- telescopic gauge
- optical projector \*

3092. The more sensitive instrument

- first oscillates more
- oscillates more slowly \*
- has no oscillations
- is never stable
- unstable

3093. Figure 10.26 shows the time displacement relation for damped motion. Which of the curves is applicable for underdamped system

- A
- B \*
- C
- D
- E

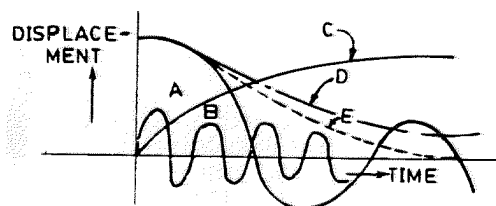


Fig.10.26.

3094. Frequency of oscillation of an instrument indicating device is a function of
- mass
  - damping
  - sensitivity
  - both damping and sensitivity \*
  - all of above, i.e. mass, damping and sensitivity
3095. The lost motion of the spindle in micrometer screw gauge when the rotation of the thimble is changed in direction is referred to as
- wear
  - lost count
  - total error
  - backlash \*
  - accuracy
3096. The effect of errors in spacing of the rollers, or height of slip gauge combination is a function of the
- $\sin \theta$
  - $\cos \theta$
  - $\tan \theta$  \*
  - $\operatorname{cosec} \theta$
  - $\sec \theta$
3097. Pick up the correct statement. The effect of pitch error and angle error is to
- increase the simple effective diameters of a bolt and decrease that of a nut \*
  - decrease the simple effective diameter of a bolt and increase that of a nut
  - increase the simple effective diameter of both bolt and nut
  - decrease the simple effective diameters of both bolt and nut
  - have no effect on simple effective diameters of bolt and nut
3098. If  $\theta$  is the included angle of a screw thread then change in simple effective diameter due to change in angle error is proportional to
- $\tan \theta$
  - $\sin \theta$
  - $\cos \theta$
  - $\sec \theta$
  - $\operatorname{cosec} \theta$  \*
3099. The best size were for ISO metric thread for measuring pitch diameters of screw thread in terms of its pitch  $p$  is
- $0.5 p$
  - $0.6 p$
  - $0.75 p$
  - $0.5773 p$  \*
  - $0.4227 p$
3100. A device for determining the value or magnitude of a quantity or variable
- sensor
  - transducer
  - gauge
  - instrument \*
  - indicator
3101. Determining moisture in steam by measuring the temperature in a throttling calorimeter is an example of
- direct measurement
  - indirect measurement \*
  - measurement by comparison
  - measurement by calibration
  - automatic measurement
3102. The closeness with which the reading of an instrument approaches the true value of the variable being measured is called
- accuracy \*
  - precision
  - sensitivity
  - resolution
  - discrimination
3103. Errors due to assignable causes are called
- static errors
  - systematic errors \*
  - calibration errors
  - random errors
  - known errors
3104. Pick up the appropriate word for a pointer moving over a scale
- instrument
  - indicator \*
  - transducer
  - gauge
  - recorder
3105. Pick up the appropriate word for A reading obtained from the motion of a pointer on a scale
- analog \*
  - digital
  - display
  - indicator
  - instrument
3106. For studying detailed variations with time, one uses
- indicator
  - digital indicator
  - recorder \*
  - integrator
  - analog indicator
3107. It responds directly to the measured quantity, producing a related motion or signal
- sensing element \*
  - transducer
  - transmitter
  - indicator
  - measuring device
3108. Which of the following is used to count the number of brass items passing on a conveyor line, when no contact is permitted with the object
- even counter
  - mechanical counter
  - magnetic pick up
  - photoelectric cell \*
  - electronic counter
3109. Which of the following does not pertain to timing device
- charging of a condenser
  - flow of oil through a dash pot
  - release of air through a nozzle
  - flow of sand through an opening
  - piezoelectric crystal \*

3110. Motion of fast-moving systems may be times and suited by means of a
- stroboscope \*
  - piezoelectric crystal
  - electronic timer
  - chronometer
  - photovoltaic cell
3111. In which device the input motion changes the inductive coupling between primary and secondary coils
- potentiometer
  - synchro \*
  - collimator
  - protractor
  - dial gauge
3112. Which effect is useful in measuring rapidly varying forces
- piezoelectric \*
  - strain gauge
  - photovoltaic
  - pneumatic gauging
  - change of capacitance
3113. Pressure measuring devices are not based on
- measure of an equivalent height of liquid column
  - measure of the force exerted on a fixed area
  - measure of some change in electrical or physical characteristics of the fluid
  - area measurement by polar planimeter \*
  - all of the above
3114. Which of the following may be measured by the deflection of an elastic element, by balancing against a known force, by the acceleration produced in an object of known mass
- force \*
  - pressure
  - temperature
  - level
  - displacement
3115. The sensitivity of reading of manometer can be increased by
- inclining the manometer tube \*
  - using low specific gravity fluid
  - application of optical magnification
  - use of level sensing device
  - all of the above
3116. Which of the following device is used as a standard for calibrating pressure gauges
- manometer
  - diaphragm
  - bellows
  - dead weight pressure tester \*
  - piezoelectric crystal
3117. Which gauge can be used to measure pressure below  $1 \mu\text{m}$
- dead weight tester
  - pirani gauge
  - ionization gauge \*
  - McLeod gauge
  - absolute pressure sensor
3118. Which of not correct statement about selection of tube material for a Bourdon gauge
- Have high creep strength to withstand high temperature \*
  - Be stable enough to maintain its calibration indefinitely
  - Be immune to corrosion from the fluid inside the tube, and from the atmosphere outside it
  - Be hard enough to withstand the applied pressure without any part of it being stressed above the limit of proportionality
  - Be easy to fabricate
3119. Hysteresis error in Bourdon tube can be minimized by
- using proper tube material
  - using proper diameter and thickness of tube
  - avoiding temperature cycling
  - using it well within the designed pressure range \*
  - using separating diaphragm and avoid direct ingress of hot. Fluid to tube
3120. Pick up false statement about pressure measurements
- low pressure is normally measured by manometers
  - medium pressure by diaphragms or bellows
  - medium and high pressure by Bourdon gauge
  - all pressures by transducers
  - absolute pressure by piezoelectric crystal \*
3121. Pressure gauges are never connected directly to live steam because
- the tubes or bellows which operate them would be overheated, causing serious error and damage \*
  - steam if leaks, can cause serious injuries to operators
  - entry of steam would cause static head error
  - parts of pressure gauge can't withstand temperature of steam
  - pressure gauges are not calibrated to measure steam pressure directly
3122. A siphon or loop in the connecting pipe is interposed as close as possible to the pressure gauge so that
- steam can condense to form a seal of water to fill the tube or bellows at the pressure being measured\*
  - air or vapour collection is avoided
  - moisture formed in pipe can be drained
  - static head errors are eliminated
  - it acts as dampener and does not pass on pressure variations to sensor
3123. Which type of device is suitable for dynamic force measurement
- level balance
  - spring balance
  - proving ring
  - piezoelectric transducer \*
  - all of the above



3124. Hysteresis errors in Bourdon tubes can be minimized by
- selecting proper material
  - proper design and fabrication
  - using them well within the designed pressure range\*
  - avoiding direct entry of steam into it
  - calibrating it from time to time
3125. In case of strain gauge transducers, several strain cycles, and temperature cycles are carried out before making measurements, in order to
- increase life
  - enable high repeatable readings \*
  - eliminate premature failures
  - increase accuracy
  - avoid drift
3126. Accuracy of standard pressure gauges, used for testing and calibration purpose is of the order of
- $\pm 1.5\%$
  - $\pm 1\%$
  - $\pm 0.5\%$
  - $\pm 0.25\% *$
  - $\pm 0.1\%$
3127. Which gauge is based on the change of heat conductivity of a gas with pressure and the change of electrical resistance of a wire with temperature
- thermocouple gauge
  - Bourdon gauge
  - Ionization gauge
  - nutating disk gauge
  - Pirani gauge \*
3128. Which of the following have relatively large and negative temperature coefficients of resistance
- radiation pyrometers
  - optical pyrometers
  - thermistors \*
  - platinum resistance detectors
  - thermocouples
3129. Thermal expansion of a solid is employed in
- thermocouple
  - resistance thermometer
  - bulb thermometer
  - bimetal element \*
  - zener diode
3130. Cold junction compensation is needed in case of measurement of temperature by
- thermocouple \*
  - thermopile
  - thermistor
  - zener diode
  - resistance thermometer
3131. Which of the following consists of a very thin strip of nickel or platinum foil which responds to temperature in the same manner as the resistance thermometer
- thermo pile
  - bolometer \*
  - radiation pyrometer
  - thermistor
  - optical pyrometer
3132. For measuring temperature in the range of -20 to 600°C, following liquid is used in glass thermometer
- mercury \*
  - alcohol
  - toluene
  - pentane
  - creosote
3133. For measuring temperature in the range of -200 to 30°C, following liquid is used in glass thermometer
- mercury
  - alcohol
  - toluene
  - pentane \*
  - cresote
3134. Which of the following glass is used for 500-600°C temperature measurement by mercury-in-glass thermometer
- lead glass
  - normal grade
  - borosilicate
  - supermax \*
  - any one of the above
3135. pick up false statement about liquid-in-metal thermometers
- remote indication of temperature can't be given \*
  - error is produced if capillary passes through hot zone
  - error also occurs if instrument base is at high ambient temperature
  - error can also creep in by the head of the liquid if the bulb is installed either above or below the Bourdon
  - these are used for industrial application where accuracy is not so important
3136. Twisting the thermocouple wires together and heat welding them
- is the standard practice of making junction
  - would result in noise generation
  - cause small errors due to local e.m.f. which may arise if the junction is too long \*
  - would slow down the response
  - result in inaccuracies
3137. Which of the following thermocouple generates highest e.m.f. for a given temperature
- copper-constantan
  - iron-constantan \*
  - chromel-alumel
  - platinum-rhodium platinum
  - silver-palladium
3138. Protective coating by a suitable cover are applied over strain gauge in order to protect it against
- temperature rise
  - dust and dirt
  - moisture \*
  - ageing
  - shorting by conductive contact

3139. The resistance of strain gauge grid used in pressure transducers is of the order of
- 0.1 to 1 ohm
  - 1 to 10 ohm
  - 10 to 100 ohm
  - 100 to 2000 ohm \*
  - 2000 to  $10^5$  ohm
3140. During temperature changing conditions, quite appreciable difference, occurs between the true temperature and the measured temperature because of the time required for the transfer of heat through thermometer sensing element. This time lag is of the order of
- 0.1 to 1 sec
  - 1 to 2.5 sec
  - 2.5 to 20 sec \*
  - 25 to 100 sec
  - 100 to 500 sec
3141. Pick up false statement
- copper-constantan thermocouple is a stable couple resistant to both oxidising and reducing atmosphere, but needs protection from acidic vapours
  - iron-constantan thermocouple suffers from oxidation attack on iron wire, if exposed
  - iron-constantan thermocouple can be made stable by using enamelled iron
  - Both wires of chromel-alumel thermocouples are prone to damage by sulphurous gases
  - copper-constantan thermocouple is used as a reference standard for calibration purpose \*
3142. Automatic cold junction compensation in thermocouple is provided by
- connecting thermocouple wires, in opposition
  - a nickel wire resistance in series with a manganin resistance \*
  - maintaining cold junction temperature constant by a cooling unit
  - using a photovoltaic cell
  - connecting a dry battery cell in opposition
3143. The material used for resistance temperature sensor is
- copper
  - nickel
  - platinum
  - any one of the above \*
  - none of the above
3144. To prevent self-heating errors becoming too great, the current through platinum element (100 ohm) is kept at a very small value
- 0.1 mA
  - 1 mA
  - 5 mA \*
  - 20 mA
  - 50 mA
3145. In calibration of temperature sensors by fixed point method, the device is calibrated at
- ice point ( $0^{\circ}\text{C}$ )
  - steam point ( $100^{\circ}\text{C}$ )
  - sulphur point ( $444.6^{\circ}\text{C}$ )
  - all of the above \*
  - none of the above
3146. Pick up the correct statement about calibration of temperature sensors by comparison method using liquid bath
- water is used for temperatures from 0 to  $100^{\circ}\text{C}$
  - special grade of paraffin oil is used for temperatures between 100 and  $200^{\circ}\text{C}$
  - For temperature between 200 and  $600^{\circ}\text{C}$ , a mixture of sodium nitrate and potassium nitrate is used
  - all of the above \*
  - none of the above
3147. Local velocity is measured by a
- pilot tube \*
  - venturi tube
  - orifice plate
  - vena contracta device
  - nozzle
3148. Flanges taps in case of orifice plate are installed
- 25 mm from each side of the orifice plate \*
  - D (pipe diameter) upstream and D/2 downstream
  - just at surface of orifice plate
  - 2.5 D upstream of orifice plate
  - any one of the above
3149. Vena-contracta taps are employed
- D upstream and D downstream from the plate
  - D upstream and at vena contracta \*
  - 2 D upstream and at vena contracta
  - just at surface of plate upstream and at vena contracta
  - any one of the above
3150. For an orifice plate having ratio of inside and pipe diameter as 0.5, the pressure loss in comparison to differential pressure created is of the order of
- 5%
  - 10%
  - 20%
  - 35%
  - 50% \*
3151.  $15^{\circ}$  taper venturi tube causes loss of following % of the differential pressure
- 5%
  - 10% \*
  - 20%
  - 30%
  - 40%
3152. Pick out false statement about advantages of orifice plates, used for flow measurement
- no moving parts
  - long-term reliability
  - high turn-down ratio \*
  - inexpensive
  - inherently simple in operation

3153. Pick out false statement about disadvantages of orifice plates
- square root relationship
  - poor turn-down ratio
  - critical installation requirements
  - short-term reliability \*
  - high irrecoverable pressure loss
3154. Dall tube is another variation of
- flow
  - pressure
  - viscosity \*
  - density
  - level
3155. Target meter is concerned with measurement of
- flow \*
  - pressure
  - viscosity
  - density
  - level
3156. The flow error in case of normal nozzles is of the order of
- 0.1%
  - 0.2%
  - 0.5%
  - 1% \*
  - 2%
3157. Which of the following flow meter maintains constant pressure differential but varies the orifice area with flow
- ledoux bell
  - variable area \*
  - straightening vane
  - variable head
  - vane-type
3158. Flow in open channels is measured by using
- nozzle
  - orifice plate
  - propeller
  - weir \*
  - vortex-shedding meter
3159. For measuring air flow, following meter is often used
- vane-type or anemometer \*
  - electro magnetic flow meter
  - vortex-shedding meter
  - ultrasound flow meter
  - pitot tube
3160. Laser droplet anemometer is used to measure
- pressure
  - velocity \*
  - level
  - density
  - temperature
3161. In which flow device the pressure loss is minimum
- orifice plate
  - nozzle
  - variable orifice meter
  - venturi tube
  - Dall tube \*
3162. Pick out the odd flow measuring device among the following
- positive displacement type
  - nutating disc type
  - sliding vane type
  - turbine type
  - hydraulic flume \*
3163. Dynamometers are
- force measuring devices
  - torque measuring devices
  - power measuring devices \*
  - energy measuring devices
  - displacement measuring devices
3164. In some measurements, in order to increase the sensitivity, two measuring and two reference cells are often used. This arrangement is usually referred to as
- wheatstone bridge
  - katharometer \*
  - attenuator
  - amplifier
  - kelvin bridge
3165. paramagnetic analyser is used to measure following gas sample in air
- oxygen \*
  - ozone
  - nitrogen
  - nitrogen oxides
  - hydrocarbons
3166. Continuous analysers for measuring following are based on the chemiluminescent flameless reaction with ethylene
- oxygen
  - ozone \*
  - sulphur oxides
  - nitrogen oxides
  - pollutants
3167. In capillary viscometer, viscosity is proportional to
- flow
  - 1/flow \*
  - $\sqrt{\text{flow}}$
  - $1 / \sqrt{\text{flow}}$
  - $1 / \text{flow}^{3/2}$
3168. Industrial flow meters are based on
- rotational devices
  - flow through restrictions
  - flow around obstructions
  - all of the above \*
  - none of the above
3169. Chromatographic analyser is used to measure the
- O<sub>2</sub> content in flue gases
  - CO<sub>2</sub> content in flue gases
  - CO content in flue gases
  - amount of individual gases in a mixture \*
  - amount of elements in an alloy

3170. The Ringelmann chart is associated with measurement of
- smoke density \*
  - SO<sub>2</sub> and SO<sub>3</sub>
  - NO<sub>x</sub>
  - CO
  - dust concentration
3171. The pH value is a measure of hydrogen ion in a solution. The letters pH stand for
- percentage of H<sub>2</sub> in solution
  - power of the hydrogen ion concentration \*
  - presence of hydrogen ions
  - purity of H<sub>2</sub>O
  - none of the above
3172. The density can be measured using
- weight
  - buoyancy
  - hydrostatic head
  - resonant elements
  - all of the above \*
3173. Electrode potential is concerned with measurement of
- density
  - viscosity
  - chemical analysis
  - pH \*
  - all of the above
3174. Almost all pH measurements are best made with a
- glass electrode \*
  - solid state electrode
  - liquid ion exchange electrode
  - redox electrode
  - heterogeneous membrane electrode
3175. Pure water has pH value of 7. This means that pure water has
- 7 g of ionized hydrogen per litre
  - 10<sup>7</sup> g of ionized hydrogen in/m<sup>3</sup>
  - 10<sup>-7</sup> % of ionized hydrogen
  - 10<sup>-7</sup> g of ionized hydrogen per litre \*
  - none of the above
3176. Which measurement is a good guide to the quality of the water
- conductivity \*
  - pH
  - dissolved O<sub>2</sub> content
  - turbidity
  - all of the above
3177. The commonly used unit of conductivity is
- mho
  - mho/m
  - μ mho/cm \*
  - ohm/m
  - mmho/mm
3178. Spectrophotometer is used to
- measure surface hardness
  - measure surface characteristics
  - measure chemical composition of alloys
  - analyse colour spectrum \*
  - analyse gas composition
3179. The change in length of humidity sensitive elements is measured by
- hydrometer
  - hygrometer \*
  - psychrometer
  - photometer
  - all of the above
3180. The orsat apparatus is used for measuring
- chemical analysis of flue gases \*
  - moisture in air
  - composition of alloys
  - colour spectrum
  - molecular configuration
3181. The error caused in vibration measuring equipment due to non compliance (not stiff) of bond made between sensor and the surface it is mounted is called
- cross-coupling
  - coupling compliance \*
  - influence error
  - subject loading by sensor
  - spurious variation in capacitance
3182. Machine health monitoring is mainly based on measurement of
- lub oil pressure
  - vibrations at strategic points \*
  - bearing temperature measurement
  - efficiency and losses of machine
  - all of the above
3183. Mass-spring seismic sensors measure directly the
- displacement
  - velocity
  - acceleration \*
  - shock
  - force
3184. An operation which, in the presence of a disturbing influence, tends to reduce the difference between the actual state of a system and an arbitrarily varied desired state and which does so on the basis of this difference, is called
- automatic control
  - feedback control
  - open feed back control
  - closed feed back control \*
  - self regulation
3185. An apparatus which measures the value of a quantity or condition which is subjected to change with time, and operates to maintain within limits this measured value, is called
- automatic regulator \*
  - self controller
  - feed back controller
  - two-position controller
  - floating regulator

3186. The time required for the controlled variable to reach a specified value after the application of a step input is called
- rise time
  - setting time
  - response time \*
  - peak time
  - proportional time
3187. The operating characteristic which inherently assists the establishment of equilibrium is called
- corrective action
  - self regulation \*
  - automatic regulation
  - proportional control action
  - floating controller action
3188. The quantity or condition of the controlled system which is directly, measured or controlled
- set point
  - deviation
  - controlled variable \*
  - command signal
  - control agent
3189. The range of values through which the variable must change to cause the final control element to move from one extreme position to the other
- throttling range \*
  - disturbance
  - proportional band
  - response
  - deviation
3190. The range of scale values through which the controlled variable must pass in order that the final control element be moved through its entire range
- throttling
  - floating band
  - controller band
  - settling time
  - proportional band \*
3191. A controller action in which there is a predetermined relation between the values of the controlled variable and the rate of motion of a final control element
- floating controller action \*
  - proportional-position controller action
  - proportional-speed floating controller action
  - two-position controller action
  - self-regulation controller action
3192. The controller action in which there is continuous linear relation between the position of the final control element and the value of the controller action
- floating controller action
  - proportional-position controller action \*
  - proportional-speed floating controller action
  - two-position controller action
  - self-regulation controller action
3193. The stability, accuracy, and speed of response of a control system are determined by analysing
- its mathematical model
  - closed-loop feedback control system
  - steady-state response
  - transient response
  - steady-state and transient response \*
3194. The steady-state performance is evaluated in terms of the
- accuracy with which the output is controlled for a specified input \*
  - maximum overshoot
  - rise time
  - response time
  - all of the above
3195. The transient performance, i.e. the behaviour of the output variable as the system changes, from one steady-state condition to another, is evaluated in terms of
- accuracy
  - settling time
  - response time
  - peak time
  - maximum overshoot, rise time, and response time\*
3196. The immediately apparent feature of an observed transient performance is
- the existence and magnitude of the maximum overshoot
  - the frequency of the transient oscillation
  - the response time
  - all of the above \*
  - none of the above
3197. Figure 10.27 shows the system response to a unit step function command  
The parameter A represents
- rise time
  - settling time \*
  - maximum overshoot
  - peak time
  - none of the above

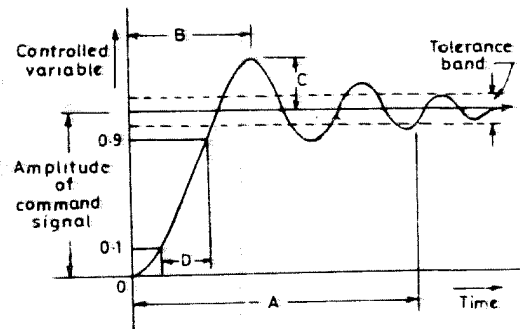


Fig.10.27.

3198. In Figure 10.27, the parameter B represents
- rise time
  - settling time
  - maximum overshoot
  - peak time \*
  - none of the above
3199. In Figure 10.27, the parameter C represents
- rise time
  - settling time
  - maximum overshoot \*
  - peak time
  - none of the above
3200. In Figure 10.27, the parameter D represents
- |                      |                  |
|----------------------|------------------|
| a. rise time *       | b. settling time |
| c. maximum overshoot | d. peak time     |
| e. none of the above |                  |
3201. The frequency response can be obtained analytically from the
- characteristic equation
  - transfer functions of the components \*
  - polar plot
  - Bode diagram
  - all of the above



# CHAPTER - 11

## MATCH THE FOLLOWING

**1. Match parts A and B in regard to properties of materials.**

A	B
1. Tendency to break under of load	a. elasticity
2. The slow stretching or continuous plastic extension under steady stress.	b. proof stress
3. Ability to be stretching before fracture	c. stiffness
4. Property to return to its original size and shape on removal of load	d. creep
5. Resistance to penetration/abrasion	e. toughness
6. Just sufficient stress to cause a specified permanent deformation	f. tenacity
7. Property to sustain shock load without permanent deformation	g. brittleness
8. Ability of a material to resist deformation	h. resilience
9. Property to resist a tensile force without giving way	i. hardness
10. Resistance to fracture by bending	j. ductility

Ans. 1.      1.    g                      2.    d                      3.    j                      4.    a                      5.    i  
                  6.    b                      7.    h                      8.    c                      9.    f                      10. e

**2. Match parts A and B in regard to mechanical properties of materials**

A	B
1. In tensile testing of materials, separation failures occur in	a. fatigue limit
2. If a specimen is first plastically strained in tension, its yield stress in compression is reduced and vice versa.	b. Mohs scale
3. A value of stress which will not produce failure, regardless of the number of applied reversals of loading	c. brittle materials
4. A diamond-tipped hammer is dropped on the surface and the rebound is taken as an index of hardness	d. creep
5. Scratch hardness is measured by	e. distortion energy theory
6. A shower of steel balls is dropped from a predetermined height to dull the surface of a hardened part in proportion to its softness and thus reveal defective areas	f. structural grade steels
7. Plastic deformation caused by slip occurring along a crystallographic directions in the individual crystals, together with some flow of the grain-boundary material	g. scleroscope
8. Prediction of the conditions under which plastic yielding will occur under combined stresses can be made by the ____	h. Bauschinger effect
9. The transition-temperature approach is often used to ensure fracture-safe design in ____	i. brittle fracture
10. Structural grade steels exhibit a characteristic temperature, known as the ductile brittle transition (DBT) temperature, below which they are susceptible to ____	j. Herbert cloud burst test

Ans. 2.      1.    c                      2.    h                      3.    a                      4.    g                      5.    b  
                  6.    f                      7.    d                      8.    e                      9.    f                      10. i



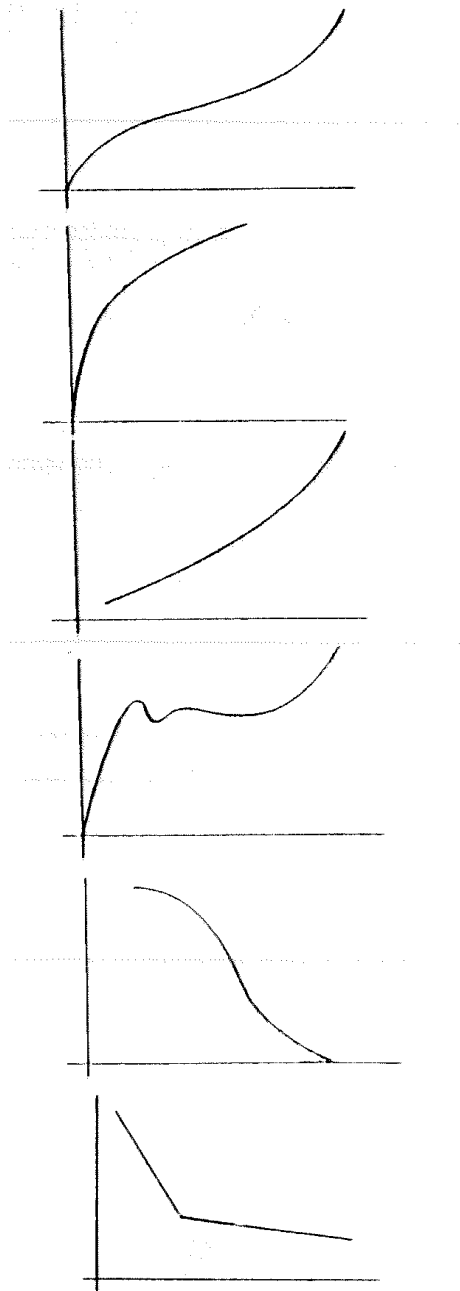




7. Match various curves in part A with description in regard to mechanical properties of materials given in part B

**A**

**B**



- a. stress strain curve for annealed steel
- b. Stress vs. cycles to failure (Fatigue)
- c. Energy for brittle fracture vs. temperature
- d. True-stress strain curve
- e. Typical creep curve
- f. Vickers hardness vs. Brinell number

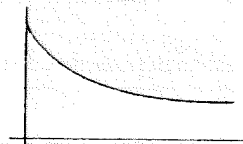
Ans. 7. 1. e      2. d      3. f      4. a      5. c  
 6. b

8. Match the figures in part A with description in Part B.

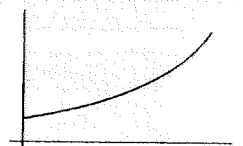
A

B

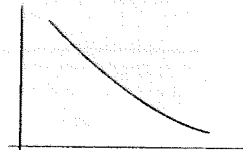
1.



2.



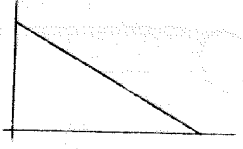
3.



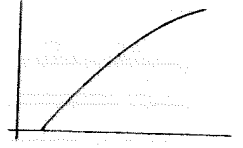
4.



5.



6.



a. creep rate vs. stress

b. effect of mean stress on the variable stress for failure

c. heat absorptivity vs. temperature of polished aluminium

d. Heat loss per area per °C temperature difference per hour vs. diameter of pipe

e. Emissivity of water vapour

f. Heat absorptivity vs. temperature for aluminium paint

Ans. 8.

1.  
6.

d  
a

2.

c

3.

f

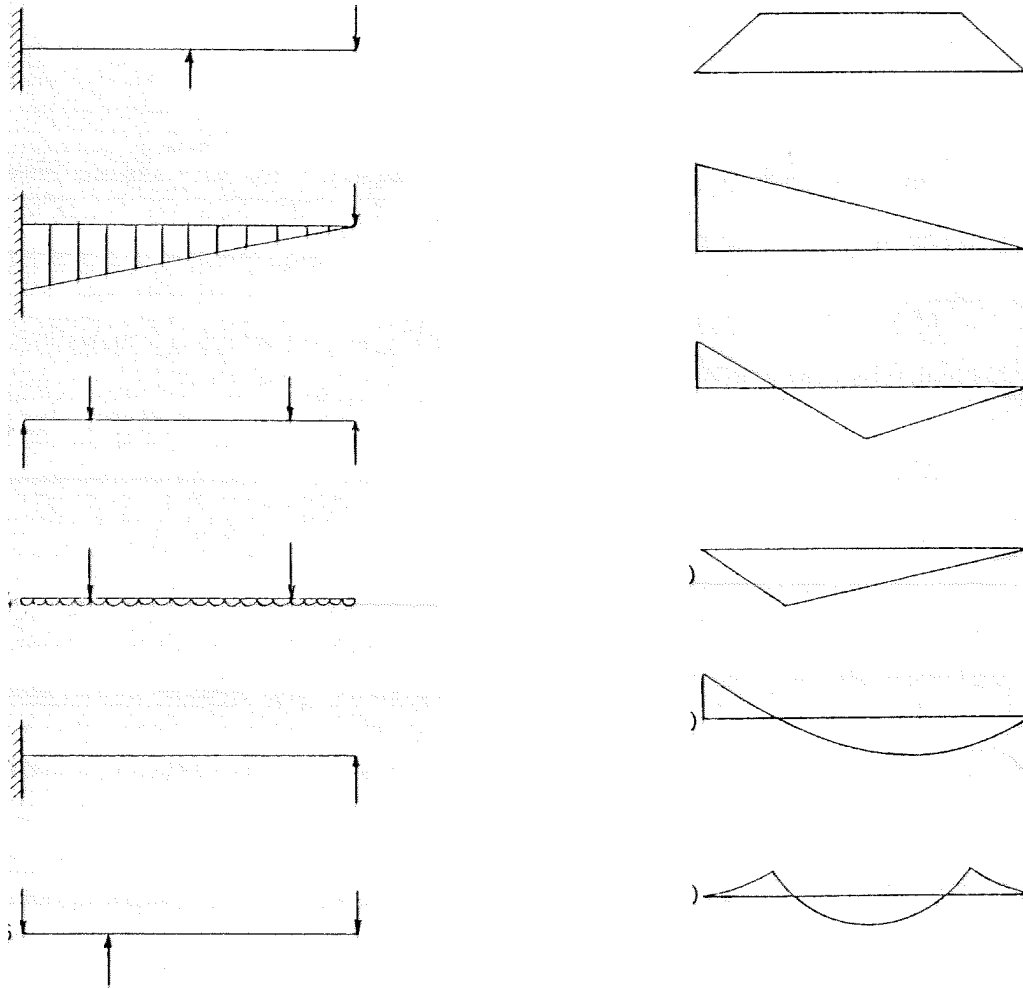
4.

e

5.

b

9. Match the figures in part A with the figures in Part B regarding bending moments for various loadings.



Ans. 9. 1. c                      2. e                      3. a                      4. f                      5. b  
 6. d

10. Match parts A and B regarding lubrication

- | A                                                                                                                                                             | B                            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| 1. The single most important property of a lubricant.                                                                                                         | a. pour point                |
| 2. The temperature at which the lubricant oil will just flow under prescribed conditions.                                                                     | b. dispersants               |
| 3. _____ is used to determine the percentage of fatty oil or fat in a compounded petroleum lubricant.                                                         | c. foam inhibitors           |
| 4. The temperature at which the grease changes from a semi-solid to a liquid state.                                                                           | d. extreme pressure agents   |
| 5. The pressure developed in a converging fluid film are suffieint to support the bearing load.                                                               | e. corrosion inhibitors      |
| 6. To reduce surface tension and allow air bubbles to seperate more readily.                                                                                  | f. dropping point            |
| 7. To keep insoluble materials suspended.                                                                                                                     | g. viscosity                 |
| 8. To neutralise acid materials and form protective fims on metal surfaces.                                                                                   | h. soild lubricant           |
| 9. To form film of lower shear strength than the base metals to reduce friction and prevent welding and seizure if and when the oil film is reptured.         | i. saponification number     |
| 10. A thin film composed of a single soild or a combination of soilds introduced between two rubbing surfaces for the purposes of modifying friction and wear | j. hydro dynamic lubrication |



**13. Match the two parts relating to bevel gears.**

- | A                                                                                                                                                | B                              |
|--------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| 1. The mathematical form of the bevel tooth profile. Closely resembles a spherical involute but is fundamentally different                       | a. pitch angle                 |
| 2. The angle formed between an element of the pitch cone and the bevel gear axis.                                                                | b. generating mounting surface |
| 3. The angle between the tooth trace and an element of the pitch cone, corresponding to helix angle in helical gears.                            | c. shaft angle                 |
| 4. The diameter and/or plane of rotation surface or shaft centre which is used for locating the gear blank during fabrication of the gear teeth. | d. dedendum angle              |
| 5. The sharp corner forming the outside diameter.                                                                                                | e. octoid                      |
| 6. The angle between elements of the face cone and pitch cone.                                                                                   | f. face width                  |
| 7. The angle between mating bevel gear axes ; also, the sum of the two pitch angles.                                                             | g. back cone                   |
| 8. The length of teeth along the cone distance.                                                                                                  | h. spiral angle                |
| 9. The angle of a cone whose elements are tangent to a sphere containing a trace of the pitch circle.                                            | i. addendum angle              |
| 10. The angle between elements of the root cone and pitch cone.                                                                                  | j. crown                       |

Ans. 13.    1.    e                    2.    a                    3.    h                    4.    b                    5.    j  
               6.    i                    7.    c                    8.    f                    9.    g                    10.   d

**14. Match the two parts relating gearing.**

- | A                                                                                                                                                                       | B                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| 1. Radial distance between the pitch circle and the top of the tooth.                                                                                                   | a. cycloid          |
| 2. The circle form which an involute curve is generated.                                                                                                                | b. roll angle       |
| 3. Length of the arc of the pitch circle between the centres or other corresponding points of adjacent teeth.                                                           | c. bottom land      |
| 4. The curve formed by the point on a circle as it rolls along a straight line.                                                                                         | d. addendum         |
| 5. That surface of the tooth which is between the pitch circle and the top of the tooth.                                                                                | e. circular pitch   |
| 6. The distance between similar, equally spaced tooth surfaces, in a given direction and along a given curve or line                                                    | f. pressure angle   |
| 7. The angle between a tooth profile and a radial line at its pitch point.                                                                                              | g. base circle      |
| 8. The angle is subtended at the centre of a base circle from the origin of an involute to the point of tangency of the generatrix from any point on the same involute. | h. base helix angle |
| 9. Surface of the gear between the fillets of adjacent teeth.                                                                                                           | i. pitch            |
| 10. The angle, at the base cylinder of an involute gear, that the tooth makes with the gear axis.                                                                       |                     |

Ans. 14.    1.    d                    2.    g                    3.    e                    4.    a                    5.    j  
               6.    i                    7.    f                    8.    b                    9.    c                    10.   h

**15. Match parts A and B for vibrations.**

- | A                                                                                                                                                                                    | B                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| 1. The amount of damping present in an oscillatory system can be judged by _____                                                                                                     | a. accelerometers        |
| 2. For free vibrations, the period of vibrations is proportional to square root of _____                                                                                             | b. small                 |
| 3. For free vibrations, the natural frequency of vibration is proportional to square root of _____                                                                                   | c. zero                  |
| 4. When the disturbing force has a very low frequency as compared with the natural frequency of the system, the magnification factor (with phase approaching zero), approaches _____ | d. 1/3                   |
| 5. When the disturbing force has a very high frequency, the magnification factor (with phase angle tending to $180^\circ$ ), approaches _____                                        | e. $\sqrt{2}$            |
| 6. For an isolator to perform its function, the natural frequency of the supported structure in comparison to frequency of the disturbing forces must be _____                       | f. static deflection     |
| 7. The transmissibility ratio is less than 1 if $\omega/\omega_n$ is greater than _____                                                                                              | g. unity                 |
| 8. For more accurate estimate of the natural frequency of system, the _____ of the weight of spring must be added to the end weight.                                                 | h. logarithmic decrement |
| 9. velocity and displacement for harmonic motion can be obtained from _____                                                                                                          | e. length                |
| 10. For uniform beam vibrating in flexure, the natural frequency is inversely proportional to square of _____.                                                                       | j. spring constant       |

Ans. 15.    1.    h                    2.    a                    3.    j                    4.    f                    5.    b  
                  6.    i                    7.    c                    8.    e                    9.    g                    10.    d

**16. Match parts A and B regarding screw fastenings.**

- | A                                                                                                                                                         | B                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| 1. A common standardisation of screw threads adopted by the screw threads adopted by the screw thread standardisation committees of Canara, U.K. & U.S.A. | a. Coarse thread series      |
| 2. Thread-series for general use, especially where rapid assembly is required and for gray iron, soft metals and plastics                                 | b. Acme threads              |
| 3. Thread-series for applications requiring greater strength or where the length of engagement is limited.                                                | c. Whitworth screw thread    |
| 4. Thread-series for highly stressed parts and where internal threads are required in thin-walled fasteners.                                              | d. Metric screw thread       |
| 5. Power transmission screw threads.                                                                                                                      | e. Unified thread standard   |
| 6. Used for fastening collars, sheaves, gears, etc.                                                                                                       | f. Oval head                 |
| 7. Included angle of thread = $60^\circ$                                                                                                                  | g. British Association screw |
| 8. included angle of thread = $55^\circ$                                                                                                                  | h. Fine thread series        |
| 9. Included angle of thread = $47\frac{1}{2}^\circ$                                                                                                       | i. setscrews                 |
| 10. Screw having a rounded surface or top of the head and a countersink angle of $82^\circ$ . Standard for machine screws and wood screws.                | j. Extra fine thread series  |

Ans. 16.    1.    h                    2.    f                    3.    j                    4.    g                    5.    c  
                  6.    b                    7.    e                    8.    d                    9.    a                    10.    i





**19. Match the two parts in relation of machine elements.****A**

1. Keys made to facilitate removal of pulleys from shafts.
2. Keys used to prevent parts from turning on a shaft while allowing them to move in a lengthwise direction.
3. A device to make a semipermanent connection between two shafts.
4. A coupling used to connect shafts having only lateral misalignment
5. A coupling made with two grooved steel hubs keys to their respective shafts and connection between the two halves being secured by a specially tempered alloy steel member called the grid.
6. A coupling in which there is no mechanical connection between the two shafts.
7. Couplings which permit the disengagement of the coupled shafts during rotation.
8. Brakes used with flywheels where quick braking is essential and large kinetic energy does not permit use of block brakes due to excessive heating.
9. Shafts with misalignment upto  $30^\circ$  can be connected with \_\_\_\_\_
10. Used to secure or lock nuts, clevises, etc.

**B**

- a. coupling
- b. eddy current
- c. clutches
- d. cotter pins
- e. Hooke's type joint
- f. Woodruff
- g. Steelflex
- h. hydraulic torque converter
- i. Oldham
- j. feather

Ans. 19.    1.    j                    2.    e                    3.    g                    4.    f                    5.    b  
               6.    h                    7.    i                    8.    c                    9.    d                    10.   a

**20. Match parts A and B pertaining to material conveying techniques.****A**

1. Used for moving granular, lumpy, or pulverised materials along a horizontal path or on an incline less than  $40^\circ$ .
2. A heavy duty conveyor available for transporting large tonnages over paths beyond the range of any other type of mechanical conveyor.
3. For long belt conveyors, to take care of expansion and contraction of belt with temperature changes and to take care of occasional cutting and respecting, a \_\_\_\_\_ is used
4. When material is drawn from a hopper or a bin to a conveyor, \_\_\_\_\_ should be used to ensure that material is fed on conveyor in a constant and controlled rate.
5. \_\_\_\_\_ conveyors are used for handling boiler plant ash or slag from an ash hopper or slag tank located under the furnace.
6. \_\_\_\_\_ conveyor transports dry, free-flowing, granular material in suspension within a pipe or duct by means of a high velocity air-steam or by the energy of expanding compressed air within a comparatively dense column of fluidised or aerated material
7. \_\_\_\_\_ pulleys are frequently used as head pulleys on belt conveyors to remove tramp iron.
8. In the case of heavy duty belt conveyor drives, \_\_\_\_\_ clutch is used to ensure that the drive torque is built up slowly.
9. \_\_\_\_\_ screw conveyors are used for wet and sticky materials, such as molasses, hot tar, and asphalt.
10. The load may be removed from the belt by \_\_\_\_\_, which snubs the belt backwards.

**B**

- a. hydraulic
- b. tripper
- c. automatic feeder
- d. magnetic
- e. dynamic
- f. lang-lay
- g. grooved
- h. splice
- i. belt
- j. pneumatic

- Ans. 20.    1.    f                    2.    j                    3.    a                    4.    i                    5.    g  
               6.    h                    7.    c                    8.    b                    9.    e                    10.   d

**21. Match the two parts in relation to equipment used for lifting.**

- | A                                                                                                                                                         | B                         |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|
| 1. For chains with low to medium hardness (less than 400 Brinell), the failure is typically due to ____                                                   | a. tension due to bending |
| 2. For chains with higher hardness, the typical mode of failure is due to ____                                                                            | b. air                    |
| 3. Haulage ropes are difficult to ____                                                                                                                    | c. regenerative           |
| 4. Lang-ray ropes are difficult to ____                                                                                                                   | d. shear                  |
| 5. Where there is side draft on the rope, movable ____ are provided to align the rope and groove                                                          | e. track                  |
| 6. Sheaves should be ____ to fit the rope as closely as possible in order to prevent the rope from assuming an oval or elliptical shape under heavy load. | f. lang-lay               |
| 7. In ____ braking, the motor, when over-hauled acts as a generator to pump current shape under heavy load.                                               | g. grooved                |
| 8. ____ are portable lifting devices suspended from a hook and operated by a hand chain                                                                   | h. splice                 |
| 9. ____ jacks are rack-and-lever jacks which may be tripped to release the load.                                                                          | i. idlers                 |
| 10. ____ hoists provide infinitely variable speed.                                                                                                        | j. hand chain hoists.     |

- Ans. 21.    1.    f                    2.    i                    3.    g                    4.    c                    5.    a  
               6.    j                    7.    d                    8.    e                    9.    h                    10.   b

**22. Match the two parts pertaining to carrying lifting device for material handling.**

- | A                                                                                                                                                                                                              | B                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| 1. The proper packaging of material to assist in handling can significantly minimise the handling cost and can also have a marked influence on the type of handling equipment employed.                        | a. cable ways       |
| 2. To facilitate the use of fork lift trucks, the load is generally placed on a ____                                                                                                                           | b. derricks         |
| 3. The use of ____ is advantageous for movement of materials where batches or unit quantities of materials of varying amounts have to be moved on variable schedules and destinations.                         | c. containerisation |
| 4. The movement of large quantities of bulk materials, earth, gravel in mining, construction, quarrying and land clearing may be handled by ____ such as crawler wheel tractors, crawler/wheel bulldozers etc. | d. cable tramways   |
| 5. Off-highway vehicles are mounted on ____ if the heavy pulling and pushing are required on poor or steep terrain.                                                                                            | e. gantry           |
| 6. ____ cranes are modifications of travelling cranes and are generally used outdoors where it is not convenient to erect an overhead runway.                                                                  | f. power showels    |
| 7. ____ are aerial hoisting and conveying devices using suspended steel cable for their tracks, the loads being suspended from carriages and moved by gravity or power.                                        | g. crawler tracks   |
| 8. ____ stand upon the bottom of pit being dug and dig above this level.                                                                                                                                       | h. lift trucks      |

9. Aerial conveying devices using suspended cables, carriages, and buckets for transporting material over level or mountainieous country or across tivers, valleys , or hills.
10. \_\_\_\_\_ are devices to lift load, housed outdoors and built so that they can be easily moved.
- i. pallet
- j. off-kighway vehicles

Ans. 22. 1. d                    2. a                    3. f                    4. h                    5. i  
6. g                    7. c                    8. j                    9. e                    10. b

**23. Match parts A and B regarding iron and steel.**

- | A                                                                                                                                                              | B                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| 1. Product of blast furnace and made by the reduction of iron ore                                                                                              | a. ingot iron          |
| 2. An alloy of iron containing so much carbon that, as cast, it is not appreciably malleable at any temperature                                                | b. wrought iron        |
| 3. Contains carbon in the combined form. The presence of cementite makes it hard and brittle                                                                   | c. steel               |
| 4. As cast, it has combined carbon not in excess of a eutecoild % age.                                                                                         | d. white cast iron     |
| 5. Open-hearth iron very low in carbon, manganese and other impurities.                                                                                        | e. malleable cast iron |
| 6. A malleable alloy of iron and carbon, usually containing substantial quantities of manganese                                                                | f. carbon steel        |
| 7. A ferrous material aggregated from a solidifying mass of pasty particles of highly refined metallic iron containing uniformly distributed quantity of slag. | g. carbon steel        |
| 8. An alloy in which all the combined carbon in a special white cast iron has been changed to free or temper carbon by suitable heat treatment                 | h. grey cast iron      |
| 9. Produced by adding alloys of magnesium or cerium to molten iron. The additions cause graphite to from into small modules                                    | i. pig iron            |
| 10. Steel that owes its distinctive properties chiefly to the carbon contained in it.                                                                          | j. ductile cast iron   |

Ans. 24. 1. i                    2. f                    3. d                    4. h                    5. a  
6. c                    7. b                    8. e                    9. j                    10. g

**24. Match parts A and B regarding steels.**

**A**

1. Sheets for deep drawing must be dead soft and have fine grains. Large grain size will cause a rough finish.
2. The sharp yield point characteristic of low carbon steel must be eliminated to prevent sudden local elongations in steel during forming, otherwise these result in strain marks called \_\_\_\_\_
3. An important phenomenon in temper-rolled low carbon steels is the return of the sharp yield point after a period of time. This phenomenon is called \_\_\_\_\_
4. Bridges and buildings are constructed with \_\_\_\_\_
5. Age hardenable martensitic steels containing normally about 12 to 18% nickel
6. Carbon-free iron-nickel martensite is relatively soft and ductile. It can thus be fabricated easily and later strengthened by a simple \_\_\_\_\_
7. The best suited steel for cryogenic services
8. Free cutting steels used for high speed screw machine stock and other machining purpose contain high content of \_\_\_\_\_
9. Addition of 0.0005% of \_\_\_\_\_ in steel increases hardenability and strength. It decreases susceptibility to flaking, result in formation of less adherent scale and offers greater softness in the unhardened condition, and better machinability.
10. An important variety of machinery steel is \_\_\_\_\_

**B**

- a. structural carbon steel
- b. % nickel steel
- c. Maraging steels
- d. H. steel
- e. aging treatment
- f. Luders lines or stretcher strains
- g. boron
- h. aging in steel
- i. Orange peel effect
- j. Sulphur

Ans. 24.    1.    i                    2.    f                    3.    d                    4.    h                    5.    a  
               6.    c                    7.    b                    8.    e                    9.    j                    10.   g

**25. Match parts A and B regarding special steels.**

**A**

1. Match parts helical springs, precisely treated steel wire is used. Which has been given a special heat treatment (patenting) and then cold drawn to develop a high yield strength
2. Electrical sheet steels.
3. Used extensively in electrical industry owing to their exceptional magnetic properties.
4. An iron nickel alloy containing 36% nickel and having exceedingly low coefficient of expansion.
5. A 42% nickel alloy covered with copper to prevent gassing at the steel, is used to replace platinum as the seal, in wire in incandescent lamps and vacuum tubes
6. A nonmagnetic alloy containing 12% Mn and 1% C. It is relative soft but work-hardness on surface when subjected to severe abrasion. Accordingly used for crushing machinery, for rail road crossing, tractor shoes, etc.
7. An iron nickel alloy containing 45% Ni and 25% Co has a constant permeability over a range of flux densities
8. Iron-\_\_\_\_\_ alloys have magnetic saturation values higher than that of pure iron.
9. Stainless steel with 18% Cr and 8% Ni
10. Stainless steels with very low carbon, non-hardenable alloys containing upto 27% Cr.

**B**

- a. Invar
- b. Perminvar
- c. austenitic
- d. music wire
- e. Hadfield's manganese steel
- f. cobalt
- g. iron-silicon alloys
- h. ferritic
- i. domet wire
- j. iron-nickel alloys

Ans. 25.    1.    i                    2.    f                    3.    h                    4.    a                    5.    c  
               6.    e                    7.    b                    8.    j                    9.    g                    10.   d

**26. Match parts A and B in connection with terms used for steel ingots.**

- | A                                                                                                                                                                                                      | B                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|
| 1. Steel in which no gas evolution occurs on solidification                                                                                                                                            | a. scabs                            |
| 2. When the steel cools in the mould, shrinkage of the steel on solidifying causes _____                                                                                                               | b. capped steel                     |
| 3. Steel not fully deoxidised to reduce the cost of hot tops wasted due to piping, but permitting blow-holes to be distributed which weld together during rolling, is called _____                     | c. segregation                      |
| 4. If steel is partly deoxidised in ladle, then oxygen and carbon form carbon mono-oxide which results in clean and low carbon outer skin of ingot. If reaction is complete then steel is called _____ | d. piping                           |
| 5. In (4) above, if reaction is stopped after a short while by mechanical means, the steel is called _____                                                                                             | e. lap                              |
| 6. Concentration of impurities in steels upon solidification                                                                                                                                           | f. semi killed steel                |
| 7. Cracks or cavities developed in mould due to presence of impurities, get elongated in the direction of rolling.                                                                                     | g. seams                            |
| 8. Improper pouring conditions (splashing of steel) in the mould of forms _____                                                                                                                        | h. rimmed steel                     |
| 9. Surface defects like seams, laps, scabs, laps etc. can be removed by _____                                                                                                                          | i. killed steel                     |
| 10. A thin and wide fin when folded over while steel passes through subsequent set of rolls.                                                                                                           | j. chipping or scarfing or pickling |

- Ans. 26.    1.    d                    2.    g                    3.    j                    4.    a                    5.    i  
                  6.    e                    7.    b                    8.    f                    9.    c                    10.    h

**27. Match parts A and B regarding constitution and structure of steels.**

- | A                                                                                                                                                                                         | B                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| 1. Pure iron having body-centres cubic arrangement of atoms.                                                                                                                              | a. delta iron      |
| 2. Pure iron at 910°C having face-centered arrangement of atoms.                                                                                                                          | b. cementite       |
| 3. Pure iron at 1390°C having body centered cubic structure.                                                                                                                              | c. ferrite         |
| 4. Alpha iron containing carbon or any other element in solid solution.                                                                                                                   | d. martensite      |
| 5. Gamma iron containing elements in solid solution.                                                                                                                                      | e. alpha iron      |
| 6. When not in solution in iron, the carbon forms a compound Fe <sub>3</sub> C which is extremely hard and brittle.                                                                       | f. hyper-eutectoid |
| 7. A microstructure of alternate plates or lamellae of ferrite and cementite which are rejected simultaneously on slow cooling through the critical temperature of eutectoid composition. | g. critical points |
| 8. When carbon does not have sufficient time to separate out in the form of carbide, the austenite transforms to a highly stressed structure super-saturated with carbon.                 | h. austenite       |
| 9. Temperatures at which the phase changes occur.                                                                                                                                         | i. gamma iron      |
| 10. The steel which when surrounded by a thin carbide network.                                                                                                                            | j. pearlite        |

- Ans. 27.    1.    i                    2.    d                    3.    f                    4.    h                    5.    b  
                  6.    c                    7.    g                    8.    a                    9.    j                    10.    e

**28. Match parts A and B regarding iron and steel castings.**

- | A                                                                                                                                                 | B                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| 1. _____ has a powerful softening effect. Its presence in cast iron reduces the ability of iron to retain carbon in chemical combination.         | a. dead soft                |
| 2. The elastic limit of _____ is close to its ultimate breaking strength                                                                          | b. magnesium and cerium     |
| 3. A thermosetting sand and resin mixture applied mechanically to a hot pattern plate for a controlled time form a layer adjacent to the pattern. | c. graphite mould process   |
| 4. Horizontal spindle machine for the casting of tubular castings                                                                                 | d. silicon                  |
| 5. A process for the manufacture of permanent moulds for casting steel car wheels.                                                                | e. tensile strength         |
| 6. _____ are employed when service requirements include dynamic loading and impact and fatigue-stress conditions                                  | f. cast iron                |
| 7. The primary difference between the production of steel for castings and for ingots is that steel for casting must be _____                     | g. shell moulding           |
| 8. Gray iron castings are classified according to _____                                                                                           | h. malleable iron           |
| 9. Nodular iron is cast iron produced by adding _____                                                                                             | i. steel castings           |
| 10. Castings having sections over 5 cm do not lend themselves to production in _____                                                              | j. true centrifugal casting |

Ans. 28.    1.    e                    2.    i                    3.    a                    4.    c                    5.    h  
                  6.    b                    7.    j                    8.    d                    9.    g                    10.   f

**29. Match parts A and B regarding mechanical treatment of steel.**

- | A                                                                                                                                | B                 |
|----------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 1. mechanical treatment at temperatures above the thermal critical range of steel.                                               | a. rolling        |
| 2. Elongation of inclusions in one direction, giving the steel excellent properties in samples taken parallel to that direction. | b. bloom          |
| 3. Working can be done in more than one direction thus eliminating directional properties to the steel.                          | c. hot working    |
| 4. Used for slow application of pressure to work the interior of a large forging more effectively.                               | d. billet         |
| 5. 150 mm square or larger sections obtained by reduction of ingot in several passes.                                            | e. cold working   |
| 6. The bloom is further reduced to sections between 30 and 150 mm square.                                                        | f. forging press  |
| 7. If the width of rolled section far exceeds the thickness of the rectangular section, it is called _____                       | g. extrusion      |
| 8. Shaping of metal into the desired form by forcing it through a die under pressure.                                            | h. glass          |
| 9. Increases greatly the yield strength and reduces the ductility.                                                               | i. hammer forging |
| 10. The lubricant used in hot extension process is _____                                                                         | j. slab           |

Ans. 29.    1.    d                    2.    f                    3.    g                    4.    j                    5.    c  
                  6.    i                    7.    a                    8.    e                    9.    b                    10.   h

**30. Match parts A and B regarding heat treatment.**

A	B
1. Rapid cooling by immersion in liquids or gases or by contact with metal.	a. heat treatment
2. Heating and quenching iron base alloys from within or above the critical range.	b. process annealing
3. A heating and slow cooling process to remove stresses, induce softness, alter ductility/toughness, refine the crystalline structure, remove gases to produce a definite microstructure.	c. normalising
4. Heating iron-base alloys above the critical temperature range, holding for 1 hour or more followed by slow cooling in furnace or medium to prolong time of cooling.	d. spheroidising
5. Heating iron-base alloys to a temperature below or close to lower limit of the critical temperature followed by cooling as desired.	e. quenching
6. Heating iron-base alloys to approx. 40°C above the critical temperature range in still air at ordinary temperature.	f. full annealing
7. Process of heating and cooling steel to produce rounded or globular form carbide.	g. hardening
8. Reheating hardened steel to some temperature below the lower critical temperature, followed by any desirous rate of cooling.	h. patenting
9. Heating iron-base alloys above the critical temperature range followed by cooling below that range in air, in molten mixture of nitrates or nitrites.	i. annealing
10. An operation involving the heating and cooling of a metal alloy in the soild state, for the purpose of obtaining certain desirable properties.	j. tempering

Ans. 30.    1.    c                    2.    a                    3.    i                    4.    f                    5.    b  
                  6.    d                    7.    j                    8.    g                    9.    e                    10.   h

**31. Match parts A and B regarding non-ferrous metal.**

A	B
1. Deoxidised copper is usually made by adding phosphorous, but this decreases the ____	a. spelter
2. Two or more elements are combined in proper proportion so as to have a minimum and specific melting temperature.	b. tungsten
3. Alloys of 12 to 25% in tin and balance lead, applied to steel by hot dipping	c. corrosion resistance
4. ____ alloys have strength comparable with alloy steels, while the weight is only 60% that of steel.	d. nickle
5. The common form of availability of zinc in the market in the form of slabs.	e. magnesium
6. Aluminium is added to brass to improve ____	f. season cracking
7. The highest melting point among all the metals.	g. terne-plate
8. The lightest metal of structural importance	h. eutectic type alloy
9. The majority of the world's production of ____ comes from the sulphide deposits in Ontario.	i. conductivity
10. High zinc brasses are prone to ____	j. titanium

Ans. 31.    1.    e                    2.    g                    3.    i                    4.    f                    5.    b  
                  6.    c                    7.    d                    8.    j                    9.    h                    10.   a

**32. Match parts A and B relating to corrosion.**

- | <b>A</b>                                                                                                                                                    | <b>B</b>               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| 1. The tendency of a metal to dissolve in water.                                                                                                            | a. chromium            |
| 2. ___ is brittle fracture of a normally ductile material.                                                                                                  | b. nickle              |
| 3. Most of the phenomena involving corrosion of metals containing or submerged in water or atmospheric corrosion by films of moisture, are ___ in nature.   | c. dis-similar metals  |
| 4. Alloys of commercially pure iron with cobalt, nickle on cppoer in small amounts are resistant to atmospheric corrosion because they form protective ____ | d. solution pressure   |
| 5. Stainless steels depend on the presence of ____ for their resistance to corrosion.                                                                       | e. rough               |
| 6. ____ cast iron has a high corrosion resistance toward many chemicals and to dilute acids and has the advantage of superior strength and toughness.       | f. rust coatings       |
| 7. ____ surfaces are more prone to corrosion.                                                                                                               | g. stress corrosion    |
| 8. A process used to minimise corrosion by applying a coating of protective metal.                                                                          | h. aluminium           |
| 9. For very servere marine conditions the only coatings that give permanent protection are those of ____                                                    | i. sheradising process |
| 10. Pipes are often destroyed by the action of ____ to which they are connected                                                                             | j. electro-chemical    |

Ans. 32.      1.    i                      2.    h                      3.    g                      4.    j                      5.    a  
                   6.    c                      7.    b                      8.    e                      9.    d                      10.  f

**33. Match parts A and B regard to non destructive testing methods.**

- | <b>A</b>                                                                                                                                                                                | <b>B</b>                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| 1. Test to detect discontinuities at or near the surface in ferromagnetic materials. Respectively fast and low cost, portable, and extremely sensitive for locating small tight cracks. | a. acoustic signature analysis |
| 2. Used to locate defects open to the surface of nonporous materials. Indication can be further examined visually and results easily interpreted.                                       | b. holography                  |
| 3. Tests based upon correlation between electro-magnetic properties and physical or structural properties of a test object. Permanent-record capability for symmertrical parts          | c. acoustic emission           |
| 4. This test involves the analysis of sound energy emitted from an object to determine characteristics of the object.                                                                   | d. Radiometry                  |
| 5. Utilise electro-magnetic energy to determine charactersitics of non metallic substances by analysis of reflected of transmitted energy.                                              | e. eddy current methods        |
| 6. Used for energy dimensional imaging. It involves no special surface preparation or coatings. No physical contact with test specimen. Vibration-free environment is required.         | f. magnetic particle           |
| 7. Measures coating thickness, physical properties and detects P-N junctions in semi-conductors. Requires access to one surface.                                                        | g. infrared (radio meter)      |
| 8. Used to measure wall thickness, plating thickness, variations in density/composition etc. Fully automatic, fast, extremely accurate and for in-line process control.                 | h. microwave test              |





## 35. Match parts A and B regarding plastic working techniques.

- | A                                                                                                                                                                           | B                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| 1. Rolling of a number of sheets together provides means of retaining enough heat to hot-roll thin sheets, as for high-silicon electric sheets                              | a. ironing       |
| 2. _____ operations are distinguished by the relatively rapid and continuous application of working pressure along a limited line of contact                                | b. hydraulic     |
| 3. Operations like blanking, piercing, perforating, shaving, broaches, trimming, slitting and parting fall under the category of _____                                      | c. clearance     |
| 4. _____ between the punch and die is required for a clean cut and durability                                                                                               | d. swaging       |
| 5. A sheared edge may be squared up roughly by _____                                                                                                                        | e. pack rolling  |
| 6. When the clearance between punch and die is less than the metal thickness, then some _____ occurs.                                                                       | f. sintering     |
| 7. _____ involves squeezing of the blanks to an appreciably different shape.                                                                                                | g. double action |
| 8. _____ process have no crank-shaft, clutch or flywheel                                                                                                                    | h. shaving       |
| 9. _____ presses combine the functions of blank holding with drawing.                                                                                                       | i. rolling       |
| 10. _____ of metal powder compacts at temperatures below the melting point provides the time and electron activity needed to established bonded strength between particles. | j. shearing      |

Ans. 35.    1.    b                    2.    f                    3.    j                    4.    i                    5.    d  
               6.    h                    7.    c                    8.    e                    9.    g                    10. a

## 36. Match the two parts pertaining to welding.

- | A                                                                                                                                                             | B                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| 1. _____ serves to exclude oxygen and nitrogen of the air from the arc and metal, thus eliminating the formation of oxide and nitrides.                       | a. anode         |
| 2. In a bare electrode d.c. arc, more heat is liberated at the _____                                                                                          | b. oxyhydrogen   |
| 3. In d.c. arc welding (straight polarity), the welded electrode is made _____                                                                                | c. flash         |
| 4. _____ welding employs the heat of an arc between a mechanically fed bare-metal electrode and the work.                                                     | d. forehand      |
| 5. Tungsten electrodes used in the gas-shielded tungsten arc welding process are _____                                                                        | e. cathode       |
| 6. _____ flame is used in welding metals that have low melting points.                                                                                        | f. flux          |
| 7. In _____ welding, the torch flame is pointed ahead in the direction of welding, and the welding rod precedes the flame.                                    | g. braze         |
| 8. In _____ welding, coalescence is produced by heating above 427°C and by using a non-ferrous filler metal having a melting point below that of base metals. | h. submerged arc |
| 9. Oxyacetylene welding of steel is performed without any _____                                                                                               | i. non-filler    |
| 10. In _____ welding, the parts are brought together lightly, with current flowing, and then separated slightly.                                              | j. shielding     |

Ans. 36.    1.    e                    2.    i                    3.    j                    4.    c                    5.    h  
               6.    a                    7.    d                    8.    b                    9.    g                    10. f

**37. Match the two parts regarding metal cutting.**

- | A                                                                                                                                   | B                 |
|-------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 1. Chips obtained in cutting ductile material at high speeds.                                                                       | a. machinability  |
| 2. Chips obtained in the machining of brittle materials at very low speed.                                                          | b. ceramic        |
| 3. The wear on the flank or relief side of the tool is the most dependable guide for ____                                           | c. continuous     |
| 4. ____ is best defined in terms of tool life, power requirement, and surface integrity.                                            | d. ceramic        |
| 5. The major factors influencing ____ are the outline of the cutting tool, fragments of built-up-edge left on working and vibration | e. cutting ratio  |
| 6. ____ tool tips consist primarily of fine aluminium oxide grains which have been bonded together                                  | f. chatter        |
| 7. The ratio of depth of cut and chip thickness                                                                                     | g. in-homogeneous |
| 8. ____ controls the thickness of the chip in metal cutting.                                                                        | h. tool wear      |
| 9. ____ chips are normally produced when machining titanium alloys.                                                                 | i. shear angle    |
| 10. Tools with large nose radius increase the possibility of ____                                                                   | j. surface finish |

Ans. 37.    1.    j                    2.    a                    3.    e                    4.    h                    5.    i  
               6.    b                    7.    d                    8.    g                    9.    f                    10.   c

**38. Match the two parts for machine tools.**

- | A                                                                                                                                                                                   | B                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| 1. A method of controlling the motions of machine components by numbers.                                                                                                            | a. reamer            |
| 2. When turret are set up for bar-stock, they are often called ____ machines.                                                                                                       | b. honing            |
| 3. A ____ machine has a single-spindle sliding head mounted over a table adjustable longitudinally and transversely by lead screws which roughly locate the work under the spindle. | c. planetary         |
| 4. The ____ angles of the flutes vary from 10 to 45°.                                                                                                                               | d. milling           |
| 5. ____ is a multiple cutting edge tool used to enlarge or finish holes.                                                                                                            | e. grinding ratio    |
| 6. ____ machines use cutters with multiple teeth.                                                                                                                                   | f. planers           |
| 7. In ____ milling machines the work is stationary on the bed or clamped to the tail-stock while the cutter rotates.                                                                | g. numerical control |
| 8. ____ are used to rough and finish large flat surface.                                                                                                                            | h. helix             |
| 9. Ratio of the volume of material removed to the volume of wheel wear.                                                                                                             | i. screw             |
| 10. A superfinishing process.                                                                                                                                                       | j. jib boring        |

Ans. 38.    1.    c                    2.    d                    3.    h                    4.    a                    5.    j  
               6.    b                    7.    e                    8.    i                    9.    g                    10.   f

## 39. Match two parts regarding industrial economics and management.

- | A                                                                                                                                                                                         | B                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| 1. A ____ organisation comprises the individuals, groups, and supervising employees concerned directly with the productivity operation of the business.                                   | a. process analysis   |
| 2. A ____ organisation involves personnel, departments, or activities and assists the line supervisors in any advisory, service, coordinating or control capacity.                        | b. break even         |
| 3. A procedure for studying all productive and non productive operations for the purpose of optimising cost, production output, or quality.                                               | c. present value      |
| 4. In ____ layout, the machinery is located so that the flow from one operation to the next is minimised for any product class.                                                           | d. linear programming |
| 5. Scheduling of production, the despatching of materials, tools and supplies at the required time so that the schedule can be realised.                                                  | e. line               |
| 6. The point at which the company neither makes a profit nor suffers a loss.                                                                                                              | f. job evaluation     |
| 7. A mathematical technique which permits determination of the best use which can be made of available resources.                                                                         | g. cost accounting    |
| 8. ____ means that a rupee recieved a year hence is not the equivalent of a rupee recieved today, because the use of money has a value.                                                   | h. staff              |
| 9. An integral part of the management process, furnishes the costs of production, operation or functions and compares actual costs and expenses with predetermined budgets and standards. | i. production control |
| 10. A formal system for ranking jobs in classes.                                                                                                                                          | j. product            |

Ans. 39.    1.    g                    2.    i                    3.    j                    4.    h                    5.    a  
               6.    d                    7.    c                    8.    f                    9.    e                    10.   b

