Aircraft Metallurgy

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

FIRST EDITION

AIRCRAFT METALLURGY

Prepared by

L.N.V.M. Society Group of Institutes
* School of Aeronautics
(Approved by Director General of Civil Aviation, Govt. of India)

* School of Engineering & Technology
(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

The knowledge of Metallurgy is essential for AMEs. For the vary reason, the training on metallurgy is imparted to AME students during one of the earlier semester.

The importance of materials in aviations and space industry is well known. The countries who had developed the advance metallurgy, and kept it as a guarded secrets, are the on date leaders of aviation and space industries.

The book gives a comprehensive knowledge on the aircraft materials, right from the manufacturing to the status of their application with view to make it useful to AME aspirants to get through DGCA examination. (Paper-II)

I appreciate with heartly thanks for the efforts of all concerned, who contributed to compile this publication as an valuable offer to AME students. My special thanks to honourable Director Mr. C.C. Ashoka for his able guidance and encouragements.

Readers are expected to suggest for improvement and detection of errors, which will be gratefully acknowledged.

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CONTENTS

CHAPTER - 1
TERMS AND DEFINATIONS

1. The property of the metal to resist penetration is
   a. Ductility b. Brittleness
   c. Hardness * d. Malleability

2. Tendency to fracture without change in shape is called
   a. Elasticity b. Density
   c. Brittleness * d. Malleability

3. The property of the metal to allow itself to be deformed permanently with out rupture is
   a. Ductility b. Malleability *
   c. Elasticity d. Density

4. The property of a metal which allows it to be drawn without breaking is known as
   a. Softness b. Malleability
   c. Ductility * d. Elasticity

5. The weight of a unit volume of a metal is
   a. Mass b. Density *
   c. Specific gravity d. None of the above

6. The range of heating temperature, when the internal structure of metal is altered is known as
   a. Tempering temperature b. Yield point
   c. Critical range * d. None of the above

7. The process of heating metal above the critical stage and then cooling slowly is known as
   a. Tempering b. Annealing *
   c. Hardening d. Normalising

8. Carburising is the process which
   a. induces carbon contents in metal
   b. hardens the metal
   c. both a. and b. are correct *
   d. None of the above is correct

9. Quenching process in heat treatment is performed by quenching the heated metal in
   a. Air b. Hot ashes
   c. Oil or water * d. None of the above

10. The re - heating of hardened metal to a temperature below critical range and followed by cooling is the process of
    a. Hardening b. Annealing
    c. Tempering * d. Normalising

11. Case hardening is the process to harden the
    a. Core of the metal b. Surface of the metal *
    c. Entire metal d. None of the above

12. The deformation of material caused by an applied load is termed as
    a. Stress b. Strain
    c. Yield strength d. Proportional limit

13. The Load limit up to which the metal can with stand with out permanent deformation or elongation is termed as
    a. Elastic limit * b. Yield strength
    c. Proportional limit d. None of the above

14. The load per square inch, a material can with stand without elongation is termed as
    a. Internal stress b. Proof stress *
    c. Internal strain d. None of the above

15. The maximum tensile load per square inch which a material can with stand is known as
    a. Torsional strength b. Tensile strength *
    c. Toughness d. Brittleness

16. The property of resisting penetration or permanent distortion is called
    a. brittleness b. hardness *
    c. malleability d. ductility

17. Hardness of a piece of metal can be increased by
    a. hammering b. rolling
    c. either a. or b. d. both a. and b. *

18. Hardness of which of the metals can be increased by heat treatment
    a. steel b. some aluminium alloy
    c. either a. or b. d. both a. or b. *

19. Which types of heat treatment is used to soften the metals
    a. annealing * b. hardening
    c. tampering d. malleability

20. The property of resisting a change in the relative position of molecules or the tendency to fracture without change of shape is called
    a. brittleness * b. malleability
    c. hardness d. ductility

21. Which of the following are very closely associated
    a. brittleness and hardness *
    b. brittleness and malleability
    c. ductility and hardness
    d. none of the above

22. Which of the materials are more brittle
a. hard material * b. soft material
c. either a. or b. d. both a. or b.

23. The property of metals which allows them to be bent or permanently distorted without rupture
a. brittleness b. malleability *
c. hardness d. ductility

24. Which of the following properties permits the manufacture of sheets, bar stock, forgings and fabrication by bending and hammering
a. brittleness b. malleability *
c. hardness d. ductility

25. Which of the following is direct opposite to the malleability
a. brittleness * b. toughness
c. hardness d. ductility

26. The property of metals which allows them to be drawn out without breaking is called
a. brittleness b. malleability
c. ductility * d. hardness

27. The property which is essential in the manufacture of wire and tubing by drawing
a. brittleness b. malleability
c. ductility * d. hardness

28. Which of the following is very similar to the malleability
a. brittleness b. ductility *
c. hardness d. elasticity

29. For aircraft use, ductile material is greatly preferred because of its
a. ease of forming b. its resistance to failure
c. both a. and b. * d. none of the above

30. In order to obtain the required strength is required
a. soft material b. hard material *
c. ductile material d. brittle material

31. The property of returning to the original shape when the force causing the change of shape is removed is called
a. ductility b. brittleness
c. elasticity * d. hardness

32. All the aircraft structural designs base are on the property of
a. brittleness b. hardness
c. elasticity * d. none of the above

33. Each material has a point beyond which if it is loaded, permanent distortion will take place, this point is called
a. yield point * b. proportional limit point
c. fracture point d. courie point

34. The weight of a unit volume of a material is called
a. density * b. ductility
c. pour point d. specific gravity

35. The property of material of being liquified by heat is called
a. fusibility * b. elasticity
c. ductility d. none of the above

36. The fusing point of steel is
a. 1500^0 F b. 10000^0 F
c. 1000^0 F d. 2500^0 F *

37. The fusing point of aluminium is
a. 1000^0 F b. 1100^0 F *
c. 900^0F d. 1300^0 F

38. The property of transmitting heat or electricity is called
a. ductility b. conductivity *
c. fusibility d. elasticity

39. Contraction is caused by ___________ of metals.
a. cooling b. heating
c. either a. or b. d. both a. and b. *

40. Expansion is caused by ___________ of metals.
a. cooling * b. heating
c. either a. or b. d. both a. or b.

41. Which of the following affects the design of welding jigs, castings and the tolerances
a. contraction
b. expansion
c. contraction and expansion *
d. none of the above

42. In aircraft construction which of the following material must be avoided to use
a. brittle * b. hard
c. ductile d. malleable

43. Critical range for the steel is
a. 1300^0 F - 1600^0 F * b. 1200^0 F - 1300^0 F
c. 1000^0 F - 1500^0 F d. 800^0 F - 1000^0 F

44. The heat treatment of steel is based on
a. critical range * b. ductility
c. brittleness d. none of the above

45. Annealing is the process of heating steel __________ critical range.
a. below b. above *
c. in d. none

46. Annealing is the process of ___________ steel.
a. galvanising b. heating *
c. anodizing d. none of these

47. In annealing the cooling of the material is
    a. very fast b. very slow *
    c. fast d. none of these

48. The annealing process ____________ the metals.
    a. soften * b. hardens
    c. reduces ductility d. increases brittle

49. Which of the following is similar to the annealing
    a. anodizing b. normalizing *
    c. carburizing d. cyniding

50. In normalizing process steel is allowed to cool in ___________.
    a. still air *
    b. water
    c. oil
    d. none of the above

51. Which of the following is the faster process ?
    a. annealing b. normalizing *
    c. both are same d. heat treatment

52. In which of the following metals normalizing is applicable
    a. steel *
    b. some aluminium alloy
    c. non-ferrous alloy
    d. none of the above

53. By normalizing, strength of the steel is increased about to
    a. 10% b. 20% *
    c. 30% d. 40%

54. Which of the following operations are used for improvement of the physical properties of a material
    a. heat treatment * b. anodizing
    c. galvanising d. none of the above

55. Hardening is composed of
    a. heating and quenching *
    b. heating and tampering
    c. tampering and quenching
    d. none of the above

56. Which of the following are the heat treatment procedure for the steel
    a. hardening b. tempering
    c. either a. or b. d. both a. or b. *

57. During Hardening of steel, it is heated at temperatures above the ____________.
    a. critical range * b. pour point
    c. yield point d. none of the above

58. During hardening of aluminium alloys these are heated to a temperature above
    a. 800^0 F b. 900^0 F *
    c. 750^0 F d. 850^0 F

59. During hardening, which is done earlier
    a. heating * b. quenching
    c. both at same time d. heat treatment

60. Quenching is the operation related with___________.
    a. ductility b. heat treatment *
    c. brittleness d. hardness

61. Quenching is the immersion of heated metal in __________.
    a. air b. liquid *
    c. water d. all are correct

62. Heated metal is immersed into a liquid to ___________ its cooling.
    a. accelarate * b. de-accelarate
    c. reduce d. slow

63. Re-heating of hardened steel to a temperature below the critical range is called
    a. tempering * b. quenching
    c. hardening d. none of the above

64. Which of the following is sometimes referred to as 'drawing'
    a. tempering * b. quenching
    c. hardening d. galvanising

65. Which of the following process relieves internal strains and softens the metals some what lesser than annealing
    a. normalizing * b. heat treatment
    c. tempering d. none of the above

66. Carburizing is the addition of _________ to steel.
    a. carbon * b. graphite
    c. diamond d. silica

67. Carburizing is best performed on steels containing less than __________ carbon content.
    a. 0.25% * b. 0.75%
    c. 0.50% d. 0.85%

68. Case hardening consists of __________.
    a. carburizing * b. anodizing
    c. galvanizing d. normalizing

69. Strain is the deformation of material caused by an __________.
    a. applied load * b. applied force
    c. applied strength d. none of the above

70. The load acting on a material is called___________.
    a. strain b. stress *
    c. tensile strength d. tempering

71. The maximum tensile load per square inch, which a material can with stand, is called
    a. tensile strength * b. strain
    c. stress d. elastic limit

72. Tensile strength is usually recorded in
    a. kg/m^2
    b. kg/mm^2
    c. $pound/inch^2$ *
    d. $lb/inch^3$

73. The greatest load per inch of original cross-sectional area, which a material can with stand without a permanent deformation, remaining upon complete release of the load is called
    a. elastic limit *
    b. proportional limit
    c. proof stress
    d. yield strength

74. In aircraft design the stress should be below the
    a. elastic limit *
    b. proportional limit
    c. pour point
    d. none of the above

75. The limit beyond which load per square inch increases in, strain cease to be directly proportional to the increase in stress, is called
    a. proportional limit *
    b. elastic limit
    c. stress limit
    d. strain limit

76. The law of proportionality between stress and strain is called
    a. Faraday's laws
    b. Hook's law *
    c. Coulomb's law
    d. Newton's law

77. The load per square inch a material can withstand without resulting in a permanent elongation of more than 0.0001 inch of gage length, after complete release of stress, is called
    a. proof stress *
    b. yield stress
    c. elastic limit
    c. none of the above

78. The load per square inch, at which a material exhibits a specified limiting permanent set or a specified elongation under load, is called
    a. yield strength
    b. tensile strength *
    c. proof stress
    d. elastic limit

79. The load per square inch at which there occurs a marked increase in deformation without an increase in load is called
    a. yield point *
    b. pour point
    c. proportional limit
    d. elastic point

80. The ratio of unit stress and unit strain is called
    a. modulus of elasticity *
    b. yield point
    c. elongation
    d. none of the above

■■■

CHAPTER - 2
MATERIAL SCIENCE AND METALLURGY

1. Material Science is based on
   a. Physics & Chemistry of internal structure *
   b. Lubrication of internal structure.
   c. Friction of internal structure.
   d. None of the above.

2. Which metal is commonly found in a pure state in nature ?
   a. Alloy steel b. Gray cast Iron.
   c. Gold * d. Cast Iron.

3. Classification of Metallurgy are
   a. Extractive, Mechanical, Physical *
   b. Physical, Chemical, Mechanical & Identical
   c. Ideal, Actual, Chemical.
   d. None of the above.

4. Extractive metallurgy deals with
   a. All about atomization of Metals.
   b. Refinement of oils.
   c. Various chemical processes.
   d. Liberation of Metal by various chemical processes*

5. Extractive Metallurgy deals with
   a. Mining, extraction & retirement only
   b. Mining, concentration, extraction & refining of metals. *
   c. None of the above.
   d. Mining & extraction only.

6. Types of Metal are
   a. Ferrous & nonferrous *
   b. Ferrous & non ferrous & ceramics
   c. Ceramics & Organics
   d. None of the above.

7. Ceramics usually consist of
   a. Clay b. Phosphate
   c. Both of the above. d. Oxides *

8. Ceramics usually consists of
   a. Oxides
   b. Nitrides & bromides
   c. Carbides & silicates
   d. All of the above *

9. Ceramic materials are
   a. Iron & Copper
   b. Rock & clay mineral material *
   c. Aluminium alloys
   d. None of the above.

10. Ceramic Materials contain compounds of
    a. Metallic & Non metallic elements *
    b. Metallic elements only.
    c. Non metallic elements only.
    d. None of the above.

11. Characteristics of ceramic are
    a. Brittle & Hard
    b. Rock like appearance
    c. Resistance to high temp.
    d. All of the above. *

12. Examples of ceramics are
    a. Copper b. Iron
    c. Concrete * d. Aluminium

13. Sand, Brick, Glass, Cement, Concrete, Insulators, Refractories, Abrasives, Plaster are
    a. Ferrous Metals b. Ceramics *
    c. Composites d. Organics

14. Organic Materials are
    a. Ceramic Materials
    b. Sand & Rock
    c.Polymer Materials Composed of carbon compound*
    d. None of the above.

15. Organic Materials have
    a. Heavy weight b. Light weight *
    c. Weightless d. None of the above.

16. Organic Materials are
    a. Soft & Ductile
    b. Combustible & Non dimensionally stable.
    c. Poor conductors of heat and electricity.
    d. All of the above *

17. Wood, Rubber & Plastic are
    a. Ceramic Material b. Organic Material *
    c. Inorganic Material d. None of the above.

18. Paper, Fuels, Lubricants, Textiles & explosive are
    a. Composite Material b. Ceramic Material
    c. Organic Material * d. Inorganic Material

19. Organic Materials are used in
    a. Electric Insulation * b. For high Hardness use
    c. For brittleness d. None of the above.

20. Fuels are
    a. Ceramics b. Inorganic Material
    c. Composites d. Organic Material *

21. Polymers have
    a. Low densities * b. High densities
    c. Medium densities d. None of the above.

22. Generally Composite Materials consist of
    a. More than one Material Type *
    b. One Material only.
    c. Metallic elements only.
    d. None of the above.

23. Fibre glass is a
    a. Ceramic Material b. Composite *
    c. Organic Material d. None of the above.

24. A composite is designed to display
    a. Only one characteristic
    b. Good characteristics only.
    c. A combination of the best characteristics *
    d. All of the above.

25. Semiconductors have electrical properties that are intermediate between
    a. Ferrous & Non ferrous metals
    b. Composite & Organic Materials
    c. Conductors and insulators *
    d. None of the above.

26. Fabrication requirements mean that the
    a. Material should be able to get shape *
    b. Material should be hard.
    c. Material should be brittle.
    d. Material should be wear resistant.

27. Economic requirement demands that
    a. Part should be hard enough.
    b. Part should be corrosion resistant
    c. Part should be made with maximum overall cost.
    d. Part should be made with minimum overall cost *

■■■

CHAPTER - 3
MANUFACTURE OF PIG IRON, PROPERTIES & USAGE

1. Metallic ores are normally obtained in the form of :
   a. Oxides and sulphides
   b. Sulphates, carbonates and nitrates
   c. Phosphates and silicates
   d. All above *

2. The pig iron contains carbon about :
   a. 2.2% b. 5%
   c. 0.15 % d. 4 % *

3. A modern blast furnace of 100 feet height with 30 feet diameter can produce pig iron in 24 hours of quantity
   a. 500 - 700 tons
   b. 700 - 1000 tons *
   c. 1300 - 1650 tons
   d. None of the above

4. The high temperature in blast furnace is obtained by
   a. By burning additional coke
   b. By increase in flux in charge
   c. By forcing a blast of hot air *
   d. By adopting all above methods

5. During pig iron production process, the slag is removed every
   a. One hour b. Two hours *
   c. Three hours d. Four hours

6. In iron production process the flux mixed in charge, helps :
   a. melting of ore
   b. Removal of impurities
   c. Both as a. and b.*
   d. None of the above

7. Pig iron is used to manufacture
   a. Lifting chains
   b. Frames of workshop machinery
   c. Surface tables
   d. None of the above *

8. The pig iron is
   a. Strong, soft and ductile
   b. Malleable and hard
   c. Weak and brittle *
   d. None of the above

9. The molten pig iron metal tapped from the furnace through channels to
   a. Sand beds b. Moulds
   c. Either of the above * d. None of the above

10. Due to great number of impurities presence, the pig iron is used :
    a. To manufacture frames
    b. To produce cast iron and wrought iron
    c. To produce steel
    d. As b. and c.*

■■■

CHAPTER - 4
MANUFACTURE OF CAST IRON

1. Cast iron contains carbon of
   a. 1% b. 0.8%
   c. 3 - 3.5% * d. 4%

2. Phosphorus contents in cast iron are :
   a. 2.2% b. 4%
   c. 1% * d. None of the above

3. Cast iron contains sulphur of about :
   a. 3 - 3.5% b. 0.8 - 1%
   c. 4% d. 1 % *

4. The furnace to produce cast iron is known as
   a. Blast furnace
   b. Cupola *
   c. Puddling
   d. Open Heath

5. To obtain the desired quality of cast iron :
   a. Carbon contents are to be varied with pig iron
   b. Pig iron is generally mixed with iron and steel scraps proportionally *
   c. Quantity of lime stone to be varied
   d. None of the above

6. The molten cast iron metal is tapped into
   a. Sand bed b. Ladle
   c. moulds d. Either of b. or c.*

7. The properties of cast iron are
   a. Brittle and weak
   b. It is very hard if chilled
   c. It cast easily and wear to good surface
   d. All above *

8. Cast iron is used for making
   a. Marking off and surface tables
   b. Vee blocks
   c. Frames for workshop machinery
   d. All above *

9. Cast irons are alloy of
   a. iron & carbon * b. iron & Mo
   c. iron & Ni d. iron & cobalt

10. Alloy cast irons contain
    a. Ni b. Cr
    c. Al d. all of the above *

11. Which of the following is not a generic type of cast iron
    a. white b. gray
    c. nodular d. none *

12. Carbon percentage is maximum in
    a. white * b. nodular
    c. compacted d. graphite

13. Carbon content is minimum possible in
    a. white b. nodular *
    c. compacted d. graphite

14. Silicon percentage is maximum in
    a. gray b. nodular
    c. compacted graphite d. both a & c *

15. The content of sulphur is of (0.01-0.03) range in
    a. gray b. nodular
    c. compacted graphite d. both b & c *

16. 0.2-1.0 percentage wt is the Mn content in
    a. gray b. compacted graphite
    c. both a. & b.* d. malleable only

17. The sulpher percentage in white steel is ___________% wt.
    a. 0.06-0.02 * b. 0.06-0.03
    c. 0.5-1.9 d. all of the above

18. The Mn percentage in white steel is
    a. 0.25-0.9 b. 0.25-0.8 *
    c. 0.06-0.02 d. none of the above

19. At eutectoid composition of the carbon percentage is
    a. 0.8
    b. 0.6
    c. between a. & b. *
    d. outside c

20. At austenite the carbon percentage is
    a. 2 b. 1.5
    c. between 2 and 1.5 * d. outside c

21. Si tends to
    a. change the reaction temperature of eutectic
    b. change the reaction temperature of eutectoid
    c. both a. & b. *
    d. none of the above

22. Carbon equivalence is a method that
    a. evaluate composition in cast steel
    b. evaluate the effect of composition in alloyed cast steel
    c. evaluate the effect of composition in unalloyed cast iron *
    d. all of the above

23. On solidification the formation of white iron increases with
    a. high carbon equivalence
    b. low carbon equivalence *
    c. constant carbon equivalence
    d. all of the above

24. Which of the following is not an nodularing elements
    a. cerium b. manganese
    c. both a. & b. d. none of the above *

25. Graphite morphology is
    a. dependent upon nature of structure of nuclei
    b. independent upon nature of structure of nuclei
    c. independent on growth of nuclei
    d. both a & c *

26. Graphite nuclei growth rate
    a. dependent upon solidification rate *
    b. independent upon solidification rate
    c. both a. & b.
    d. none of the above

27. Which of the following graphite forms are interconnected
    a. flake b. under cooled
    c. spheroidal d. all of the above *

28. Flake graphite formation is encouraged with
    a. constant solidification rate
    b. slower solidification rate *
    c. higher solidification rate
    d. all of the above

29. In case of hypo-eutectoid irons, due to the precipitation of prior austenite dendrites in liquid
    a. volume available for graphite growth is more
    b. volume available for graphite growth is less *
    c. above is unaltered
    d. none of the above

30. As compaired to eutectic complex the graphite in austenite phase is
    a. predominant in mass
    b. predominant in volume
    c. both a. & b. *
    d. none of the above

31. The amount of under cooled graphite increases
    a. with a decrease of sulpher content
    b. with increase of sulpher content
    c. with increase of solidification cooling
    d. both a & c *

32. The amount of graphite increases with a decrease of sulpher content in
    a. under cooled graphite *
    b. compacted graphite
    c. spheroidal graphite
    d. all of the above

33. In compacted structure iron is held at eutectic range for a long time with
    a. high concentration of nodular element *
    b. low concentration of nodular element
    c. moderate concentration of nodular element
    d. all of the above

34. The end of graphite in compacted graphite form are
    a. blunt b. round
    c. both a. & b. * d. none

35. To get spheroidal graphite in cast iron
    a. slow cooling rate required
    b. moderate cooling rate required
    c. rapid cooling rate required *
    d. all of the above conditionaly

36. Which of the following are not eutectics
    a. austenite-graphite
    b. austenite carbide
    c. both a. & b.
    d. none *

37. Eutectics austenite is observed during
    a. eutectic solidification *
    b. eutectic liquidification
    c. eutectoid liquidification
    d. eutectoid solidification

38. The primary eutectic growth
    a. raises heat of surrounding *
    b. reduces heat of surroundings
    c. never effects surrounding temperature
    d. none of the above

39. The merphology of the faceted graphite phase
    a. depends on the composition
    b. depends on the growing interface
    c. independent on the composition
    d. both a. & b. *

40. The growth rate of austenite-carbide eutectic is ___________ than the austenite graphite eutectic.
    a. higher b. much higher *
    c. lower d. much lower

41. The growth of austenite over cementite plate
    a. stabilises the cementite
    b. destabilises the cementite *
    c. none
    d. stabilises the austenite

42. The sulpher get absorbed on the boundary layer in under cooling
    a. due to it's surface activeness
    b. due to it's surface reactiveness *
    c. due to it's surface stability
    d. all of the above

43. Under cooled means liquid immediately in front of the interface will have
a. high liquidus temperature
b. low liquidus temperature *
c. very high liquidus temperature
d. none of the above

44. The amount of sulpher content in cast iron is
a. < 0.04 wt % *
b. > 0.04 wt %
c. < 0.06 wt %
d. > 0.06 wt %

45. The small amount of sulpher
a. oposses the carbide formation
b. provides under cooling
c. provides the carbide formation
d. both b & c *

46. Which is false about small amount of sulpher among following
a. provides under cooling
b. provides the carbide formation
c. hinders the growth of graphite flakes
d. oposes under cooling *

47. Manganese reacts with iron/iron sulphide
a. MnS b. Mn-Fe_2S
c. both a. & b. * d. none

48. Excess of Mn
a. provides under cooling *
b. prevent under cooling
c. do not promotes carbide formation
d. all of above

49. Excess of ___________ promote carbide formation.
a. sulphur b. manganese *
c. phosphorous d. silicon

50. Which of the following is false for steadite
a. it is hard
b. brittle
c. segrigate at grain boundary
d. none *

51. Which of the following forms steadite when react with iron
a. sulpher b. manganese *
c. phosphorous d. silicon

52. The amount of phos phorous content in cast iron is
a. $= 5\%$ b. $> 5\%$ *
c. $< 5\%$ d. none

53. Which of following act as a graphitizer
a. sulpher b. manganese
c. phosphorous d. silicon *

54. Which of the following is false about the excess content of phosphorous in cast steel
a. leads to formation of cellular network
b. decreases machinability
c. decreases impact strength
d. promotes carbide formation *

55. Viscosity of cast iron is influenced by
a. quantum of silicon present *
b. quantum of manganese present
c. quantum of sulphur present
d. quantum of phosphorous present

56. Upto 0.9% silicon presence
a. increases viscocity * b. decreases viscocity
c. both a. & b. d. all of above

57. Viscocity decreases if silicon content in cast iron is
a. $= 0.9\%$ b. $> 0.9\%$ *
c. $< 0.9\%$ d. none

58. Graphite annealed at 900-950^0 C produces
a. pearlite-graphite b. pearlite-carbide
c. ferrite-graphite d. both a. & b. *

59. The temperature range that allow the combined carbon to precipitate as graphite is
a. 700-800^{0}C b. 790-800^{0}C
c. 700-900^{0}C d. 790-980^{0}C

60. Ferritizing anneal at 700-760^0 C
a. produces pearlite graphite
b. produces pearlite carbite
c. produces ferrite graphite
d. converts the pearlitic carbide to terride *

61. Annealing of ductile irons is accomplished by single stage at
a. 700^{0}C b. 705^0 C *
c. 600^{0}C d. 605^{0}C

62. Annealing of ductile irons is accomplished by double stage at
a. 600-700^{0}C b. 680-700^{0}C *
c. 680-800^{0}C d. 680-850^{0}C

63. Which of the following consists dendrites of transformed austenite
a. white iron * b. gray iron
c. nodular iron d. compacted iron

64. In which of the following quite rapid solidification takes place
a. white iron * b. gray
c. nodular iron d. compacted iron

65. In which of the following the graphite grows as sheres by means of additives like manganese, cerium
a. white iron b. gray iron
c. nodular iron * d. compacted iron

66. In adequate additions made to the ladle produces graphite in
    a. white iron b. gray iron
    c. nodular iron d. compacted iron *

67. Which of the following is characterised by microstructure consisting of uniformly dispersed fine particles of temper carbon in a mixture of ferrite or tempered martensite
    a. white iron b. gray iron
    c. nodular iron d. malleable iron *

68. Various grades of pearlitic/martensitic malleable iron are achieved by controlled annealing of
    a. white iron * b. gray iron
    c. compacted iron d. all of above

69. Which of the following is not an application of gray cast iron
    a. structural castings
    b. medium dutybrake drums
    c. clutch plates
    d. chemical plate equipment *

70. Which of the following is a typical application of gray cast iron
    a. paper dryer rolls b. valves for steam
    c. gears d. fly wheels

71. Which of following is an application of ductile cast iron
    a. paper dryer rolls b. steering knuckless
    c. camshafts * d. disc brake callipers

72. Which of the following is an application of ductile cast iron
    a. automatic discs
    b. steering knuckless *
    c. heavy gear boxes
    d. mounting brackets

73. Which of the following is an application of malleable cast iron
    a. automotive disc b. drum breaks
    c. mounting brackets * d. furnace parts

74. Which of the following is not an application of malleable steel
    a. automotive disc * b. flanges
    c. valve parts d. transmission gears

75. Which of the following is an application of alloy iron
    a. flanges b. automotive disc *
    c. paper dryer rolls d. structural casting

76. Valve parts for rail roads and marines are manufactured of
    a. gray cast steel b. Ductile cast steel
    c. malleable cast steel * d. alloy iron

77. Housing for automotive gas turbine engine is manufactured of
    a. gray cast steel b. ductile cast steel
    c. malleable cast steel d. alloy iron *

78. Disc-brake callipers are manufactured of
    a. gray cast steel b. ductile cast steel *
    c. malleable cast steel d. alloy iron

79. Heavy gear boxes & fly wheels are manufactured of
    a. gray cast steel b. ductile cast steel *
    c. malleable cast steel d. alloy iron

80. Steering gear housing is manufactured of
    a. gray cast steel b. ductile cast steel
    c. malleable cast steel * d. alloy iron

81. Dics for hot forming of aerospace components are manufactured of
    a. gray cast iron b. ductile cast steel
    c. malleable cast steel d. alloy iron *

82. Transmission gears are manufactured from
    a. gray cast steel b. ductile cast steel
    c. malleable cast steel * d. alloy iron

83. Mounting brackets are manufactured from
    a. gray cast steel b. ductile cast steel
    c. malleable cast steel * d. alloy iron

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CHAPTER - 5
MANUFACTURE OF WROUGHT IRON

1. Wrought iron is one of the :
   a. Weakest form of iron b. Strongest form of iron
   c. Purest form of iron * d. Hardest form of iron

2. Wrought iron contains carbon
   a. 1% b. 0.8 - 1 %
   c. 0.15 % * d. None of the above

3. Wrought iron is produced from pig iron by puddling process in
   a. Blast furnace b . Cupola furnace
   c. Reverberatory furnace*d. Either of the above

4. The reverberatory furnace hearth is lined with
   a. Refractory bricks
   b. Iron oxide in the form of scale
   c. High grade iron
   d. Any of as per b. and c. *

5. Before producing wrought iron, preliminary refining of pig iron is done by
   a. Melting it with more lime stone
   b. Blasting air through molten pig iron *
   c. Puddling the molten metal
   d. None of the above

6. The preliminary refining of pig iron results in:
   a. Removal of silicon
   b. Removal of most of the phosphorus
   c. Conversion of free carbon into combined carbon
   d. All above *

7. After preliminary refining of pig iron, the wrought iron is produced by
   a. Adding iron oxide in the molten metal
   b. Allowing the temperature to fall
   c. Removing most of the impurities through slag
   d. Adopting all above processes *

8. The wrought iron is ductile and malleable. It is commonly used to make :
   a. Workshop machinery frames
   b. Cores of dynamos
   c. Lifting chains
   d. Both as b. and c.*

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CHAPTER - 6
PRODUCTION OF STEEL
(CEMENTATION AND CRUCIBLE PROCESSES)

1. Steel is fundamentally an alloy of iron and carbon, with the carbon contents varying from :
   a. 1 to 2.2 % b. 1.5 to 4%
   c. 0.25 to 1.5 % * d. None of the above

2. Which statement is true
   a. Low carbon steel contains upto 0.25% of carbon
   b. Medium carbon steel contains from 0.25 to .75% of carbon
   c. High carbon steel contains from 0.75 to 1.5% of carbon
   d. All above are true *

3. Which of the following methods are adopted for manufacture of steel
   a. Cementation and crucible processes
   b. Bessemer and open hearth processes
   c. Electrical process
   d. All above *

4. In cementation process, wrought iron bar enveloped by charcoal powder is heated in furnace at about
   a. 800°C b. 1000°C
   c. 700 °C * d. 1200 °C

5. To produce the desired quality of steel, by cementation process, is heated to high temperatures for
   a. 15 to 20 days b. 10 to 20 days
   c. 5 to 14 days * d. 7 to 14 days

6. The steel produced by cementation process is known as
   a. Cast steel b. Tool steel
   c. Blister steel * d. None of the above

7. By cementation process, the amount of carbon introduced into the iron is
   a. 0.25 to 0.50% b. 0.50 to 0.75%
   c. 0.75 to 1.5% * d. None of the above

8. To produce the steel by crucible process, the base metal used is :
   a. Fragment of blister steel
   b. Short length of wrought iron bar
   c. Either of the above *
   d. None of the above

9. In crucible process to produce the steel the base metal mixed with charcoal is heated in
   a. Refractory bricks hearth
   b. Fire clay crucibles *
   c. Either of the above
   d. None of the above

10. The steel produces by crucible process is known as
   a. Cast steel b. Tool steel
   c. Either of above * d. None of the above

11. Cast steel is perfectly homogeneous product and extremely hard, hence, it is used for
   a. Making finest cutlery b. Making Cutting tools
   c. Both as a. and b.* d. None of the above

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CHAPTER - 7
PRODUCTION OF STEEL
(BESSEMER AND OPEN HEARTH PROCESS)

1. In bessemer process
   a. Wrought iron is melted in converter
   b. Molten pig iron from blast furnace is directly poured in converter
   c. The strong air blast for about 20 minutes oxidises all carbon and silicon
   d. As per b. and c. happens *

2. In bessemer process of steel production, the desired carbon and manganese is obtained by adding
   a. Iron oxide
   b. Manganese
   c. Ferro - manganese *
   d. None of the above

3. In bessemer process, the molten metal from ladle is poured into
   a. Send bed b. Crucible
   c. Rectangular moulds * d. Either of above

4. In open hearth furnace, the intense heat is obtained due to
   a. Burning extra fuel
   b. Its re - generative process *
   c. Both above processes
   d. None of the above

5. In open hearth process charge contains
   a. Pig iron with flux
   b. Steel scraps with flux
   c. Iron ore with flux
   d. All three above with flux *

6. The Open hearth furnace is fuelled by
   a. Coal b. Oil
   c. Gas * d. Any of above

7. In open hearth furnace the re - generators are arranged in
   a. A single pair b. Two pairs *
   c. Three pairs d. Four pairs

8. The re - generators receives heat from :
   a. by gas firing
   b. Out going hot gases to chimney *
   c. Either of the above
   d. None of the above

9. The direction of air and gas flow through regenerator to furnace is reversed about
   a. Every half hour * b. Every hour
   c. Every 15 minuets d. None of the above

10. In open hearth furnace after molten metal is tapped into ladle, the ferro manganese is added to
    a. Restore malleability b. To carburise the iron
    c. Do both above * d. Do none of the above

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CHAPTER - 8
PRODUCTION OF STEEL (ELECTRICAL PROCESS)

1. In electrical process of steel production, types of furnaces used are :
   a. Low frequency b. High frequency
   c. arc furnace d. Both as b. and c.*

2. For electrical process of production of steel, the charge is taken from
   a. Blast furnace b. Cupola furnace
   c. Open hearth furnace * d. Either of above

3. In electrical process of steel production the alloying constituents are added :
   a. Along with the charge
   b. After tapping from the furnace
   c. After removal of slag from molten metal in the furnace *
   d. Any way of the above

4. The great advantage of electrical furnace is absence of
   a. Gas
   b. Fume
   c. Impurities caused by burning of fuel
   d. All above *

5. The properties of the low carbon steel are
   a. Ductile and malleable
   b. Stronger, harder and uniform
   c. Can be forged, welded and machined
   d. All as a. and c.*

6. Usage of low carbon steel are to manufacture
   a. Bolts and Tubes
   b. Rivets and plates
   c. All parts where great strength or hardness not required
   d. All above *

7. The properties of medium carbon steel are
   a. Stronger and harder
   b. Less ductile and malleable
   c. Can be easily worked
   d. As per a. and b.*

8. Usage of medium carbon steel are to manufacture
   a. Shaft, rods, bolts tubes
   b. Tools e.g. hack saw, hammer head etc.
   c. Crankshaft
   d. As per a. and b.*

9. Properties of high carbon steel are
   a. strong, hard and tough* b. Ductile and malleable
   c. Brittle d. None of the above

10. The usage of high carbon steel are to manufacture
   a. Cutting tools e.g. chisels
   b. Hand saw and drills
   c. Taps, die, reamers, punches and files etc.
   d. All above *

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CHAPTER - 9
PROPERTY OF MATERIALS

1. Mechanical properties include those characteristics of material that describe its.
   a. Behaviour under the action of external forces *
   b. Behaviour under the action of internal forces.
   c. Behaviour under the passing of electrical current.
   d. None of the above.

2. Mechanical properties can be determined by conducting experimental tests on the
   a. Part to be manufactured
   b. Material Specimen *
   c. Noway to test Mechanical Properties.
   d. Only by observation of component.

3. After uploading the property of attaining its original shape is known as
   a. Brittleness b. Hardness
   c. Plasticity d. Elasticity *

4. The property of a material by virtue of which it may be permanently deformed is called
   a. Plasticity * b. Elasticity
   c. Toughness d. None of the above.

5. The ability of the material to absorb energy during plastic deformation upto fracture is called
   a. Ductility b. Toughness *
   c. Resilience d. Plasticity

6. Toughness is closely related to
   a. Resilience * b. Plasticity
   c. Elasticity d. Endurance

7. The capacity of Material to absorb energy when it is elastically deformed and then upon ,unloading, to have energy recovered is called
   a. Endurance
   b. Toughness
   c. Resilience *
   d. None of the above.

8. Ratio of Maximum load to original cross section area is called
   a. Tensile strength
   b. Ultimate tensile strength
   c. Both (a) & (b) *
   d. Tensile load

9. Strain is defined as ratio of
   a. Force & Area
   b. Changed configuration to original configuration *
   c. Original configuration to change configuration.
   d. None of the above.

10. Ductility is a measure of the degree of
    a. Hardness b. Toughness
    c. Plastic deformation * d. Elastic deformation.

11. The capacity of a material to withstand deformation under compression without rupture is known as
    a. Ductility b. Malleability *
    c. Hardenability d. Brittleness

12. Brittleness is opposite to
    a. Ductility b. Malleability
    c. Both a & b * d. Toughness

13. The tendency to fracture without appreciable deformation called is
    a. Hardness b. Toughness
    c. Brittleness * d. None of the above.

14. A brittle material has
    a. Higher ductility b. Lower ductility *
    c. Medium ductility d. No ductility

15. Brittle fractures normally follows the
    a. Grains b. The grain boundaries *
    c. Both (a) & (b) d. None of the above.

16. Ductile fractures normally occur at the
    a. Grains * b. Grain boundaries
    c. Atoms d. All of the above.

17. The resistance of a Material to plastic deformation is known as
    a. Hardness * b. Toughness
    c. Brittleness d. Ductility

18. Brinell, Rockwell & Vickers test is related to
    a. Brittleness b. Toughness
    c. Roughness d. Hardness *

19. Fatigue is the phenomenon that leads to fracture by
    a. Uniform load b. Fluctuating load
    c. Repeated load d. Both (b) & (c) *

20. Fatigue failure is like
    a. Brittle in nature * b. Ductile in nature
    c. Not predictable d. None of above.

21. Creep is a
    a. Force dependent Phenomena
    b. Time dependent Phenomena *
    c. Both (a) & (b)
    d. None of the above.

22. Wear is a
    a. Unintentional removal of solid material *
    b. Intentional removal of solid material.
    c. Addition of Material to the mother metal.
    d. None of the above.

23. Creep is the
    a. Pressure dependent phenomena
    b. Non permanent deformation of material.
    c. Permanent deformation of Material. *
    d. None of the above.

24. Alloy contents such as addition of W, Cr etc. improve hardness &
    a. Colour of Material b. Strength of Material *
    c. Neither (a) nor (b) d. Both (a) and (b)

25. Crystal imperfection such as dislocations reduces the
    a. Strength of the Material *
    b. Stress of Material
    c. Strain of Material
    d. Weight of Material

26. Excessive cold working produces
    a. Strain hardening * b. Stress hardening
    c. Case Hardening d. None of the above.

27. In the following, which one is the manufacturing defect
    a. Cracks b. Blowholes
    c. Misruns d. All of the above *

28. On the basis of grain size, the materials are classified as
    a. Uniform grain Materials & non uniform grain of material.
    b. Thin grain material & thick grain material.
    c. Coarse grained materials & fine grained materials*
    d. None of the above.

29. Fine grained Materials possess
    a. Higher strength & toughness
    b. Hardness
    c. Resistance to suddenly applied force.
    d. All of the above *

30. Fine grained materials are
    a. Medium crack resistant
    b. Less crack resistant
    c. More crack resistant *
    d. None of the above.

31. Fine grained materials are prefered for
    a. Structural applications *
    b. Fibrous applications.
    c. Both (a) & (b)
    d. Neither (a) nor (b)

32. A coarse grained material is responsible for
    a. Toughness b. Surface roughness *
    c. Less ductility d. None of the above.

33. A coarse grained material possess
    a. More ductility b. Malleability
    c. Better Machinability d. All of the above. *

34. Coarse grained metals are difficult to
    a. Polish b. Plating
    c. Both (a) & (b) * d. Neither (a) or (b)

35. Heat treatment is done to improve
    a. Chemical composition.
    b. Colour.
    c. Properties like Machinability, ductility, homogeneous structure. *
    d. Weight of material.

36. For the formation of oxide layer on the surface of Mild steel, the responsible factor is
    a. Air b. Humid Air *
    c. Lubricants d. None of the above.

37. The oxide film formed in case of corrosion acts as a
    a. Protective coating *
    b. Destructive coating
    c. Thin coating
    d. None of the above.

38. Protective coatings of oxide film on Al, Ni, Cr resists further
    a. Oxidation * b. Corrosion
    c. Retardation d. None of the above.

39. Electrochemical corrosion may result due to
    a. Wetting of Metals
    b. Drying of Metals
    c. Humid air
    d. Alternate wetting and drying of metals. *

40. The most important factor promoting atmospheric corrosion is the
    a. Chemical reaction b. Relative humidity *
    c. Dry bulb temperature d. Wet bulb temperature

41. When the metals are subjected to a very hot atmosphere there is
    a. Reduction in tensile strength and yield point
    b. Allotropic and other phase changes
    c. Creep
    d. All of the above. *

42. Accelerated oxidation & grain boundary weakening occurs when
    a. Metals are subjected to a cold & humid atmosphere
    b. Metals are subjected to cold atmosphere
    c. Metals are subjected to a very hot atmosphere *
    d. None of the above.

43. The study of the behaviour of matter at temperature below 200^{o}C is called
    a. Polymerization b. Cryogenics *
    c. Refrigeration d. None of the above.

44. At lower temperatures, ductile material become
 a. Hard
 b. Stiff
 c. both above and also brittle *
 d. None of the above.

45. Creep Strength improves at
 a. Lower Pressure b. Lower Temperature *
 c. Higher Temperature d. Higher Pressure

46. F.C.C. metals and alloys retain their ductility substantially upto
 a. 24°C * b. 42°C
 c. 48°C d. 50°C

47. Specific heat is the quantity of heat that must be added to a unit mass of the solid to raise its temperature by
 a. 1 Degree * b. 2 Degree
 c. 1/2 Degree d. 3 Degree

48. Specific heat is given by
 a. $C = \frac{1}{m}\frac{dE}{dT}$ * b. $C = \frac{1}{m}\frac{dT}{dE}$
 c. $\oint \frac{dQ}{dT}$ d. none of the above.

49. Coefficient of thermal expansion is given as
 a. $\frac{1}{\ell}.\frac{d\ell}{dT}$ b. $\frac{d\varepsilon}{dT}$
 c. $\frac{1}{\ell}.\frac{dT}{d\ell}$ d. both (a) and (b) *

50. The melting point of the material is related to
 a. Bonding forces in solid *
 b. Chemical composition of solid
 c. Ice point of metal
 d. Fire point of metal.

51. Melting point of Mild steel is
 a. 700°C b. 1500°C *
 c. 1400°C d. 900°C

52. Melting point of copper is
 a. 1060°C b. 1080°C *
 c. 1020°C d. 1100°C

53. Melting point for aluminium is
 a. 500°C b. 450°C
 c. 650°C * d. 1300°C

54. The conditions of a body when it is subjected to sudden & severe change in temperature are called
 a. Fluctuating shock
 b. Shock
 c. Thermal shock *
 d. None of the above.

55. In quench cracking the stresses developed known as
 a. Residual stresses * b. Internal stresses
 c. Relieved stresses d. All of the above.

56. When thermal cracking occurs without a severe quench it is usually called
 a. Dark quenching b. Spalling *
 c. Selling d. None of the above.

57. The ability of a materials and its properties to remain stable with change in temperature is known as
 a. Heat distortion b. Heat Resistance *
 c. Temperature capacity d. None of the above.

58. Resistivity is a
 a. Electrical Properties *
 b. Mechanical Property
 c. Magnetic Property
 d. Chemical Property

59. The reciprocal of electrical resistivity is called as
 a. Dielectric strength
 b. Thermoelectricity
 c. Electrical Conductivity *
 d. None of the above.

60. In Ionic conductivity, the charge carried may be
 a. Negative
 b. Positive
 c. Don't have any charge
 d. Either positive or Negative *

61. In electronic conductivity, carriers are
 a. Electrons only
 b. Electron holes only
 c. Both electrons & electron holes *
 d. None of the above.

62. Magnesium (Mg) is a
 a. Conductor * b. Insulator
 c. Semiconductor d. Superconductor

63. Zinc and sodium are
 a. Conductor b. Insulator
 c. Semiconductor * d. Superconductor

64. In Insulators balance band is
 a. Completely filled * b. Partially filled
 c. Completely empty d. None of the above.

65. The insulating capacity of a material against high voltage is
 a. Super conductivity b. Dielectric strength *
 c. Thermoelectricity d. None of the above.

66. Permeability is a
 a. Thermal Property
 b. Chemical Property
 c. Magnetic Property *
 d. None of the above.

67. In the following, Magnetic Property is
    a. Coercive Force b. Hysteresis
    c. Superconductivity d. All of the above *

68. Corrosion Resistance is a
    a. Chemical Property * b. Thermal Property
    c. Magnetic Property d. Electrical Property

69. Refractive index is given by
    a. $\eta = \frac{C}{V} \cdot \frac{1}{\ell}$ b. $\eta = \frac{\sin i}{\sin r}$ *
    c. $\eta = \frac{\rho}{\nu}$ d. none of above.

70. Absorptivity is a
    a. Magnetic Property b. Optical Property *
    c. Mechanical Property d. None of the above.

71. Dimension, Colour, Appearance, Density and Melting Point are
    a. Mechanical Properties
    b. Dimensional Properties *
    c. Optical Properties
    d. None of the above.

72. Density is the ratio of
    a. Mass to volume * b. Volume to mass
    c. Weight to volume d. None of the above.

73. Unit of density is
    a. kg/m^3 * b. m^3/kg
    c. N/m^3 d. $kg.\ f/N^2$.

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CHAPTER - 10
AIRCRAFT STEELS - PROPERTIES AND USES

1. Percentage of carbon in silicon-chromium
   a. 0.45 - 0.5% * b. 0.25 - 0.6%
   c. 1.2 - 3.5% d. 0.05 - 0.75%

2. Percentage of manganese in silicon-chromium
   a. 0.7 - 0.9% * b. 0.25 - 0.6%
   c. 0.45 - 0.5% d. none

3. Percentage of phosphorous present in silicon-chromium
   a. 0.06% b. 0.04% *
   c. 0.40% d. 4.0%

4. Percentage of sulphur present in silicon-chromium
   a. 0.04% * b. 0.4%
   c. 4.0% d. 0.004%

5. Percentage of chromium present in silicon-chromium
   a. 0.25 - 0.35 * b. 0.15 - 0.25
   c. 0.35 - 0.45 d. none

6. Percentage of silicon present in silicon-chromium
   a. 3.00 - 3.50% * b. 2.5 - 3.0%
   c. 2 - 2.5% d. none

7. Nitriding steels have a __________ percentage of carbon is
   a. 0.30 to 0.45% * b. 1.2 to 3.5%
   c. 2.2 to 4.5% d. none

8. Percentage of manganese in a nitriding steel is
   a. 1 to 5% b. 2 to 3%
   c. 0.4 to 1.0% * d. none

9. Percentage of phosphorous in nitriding steel is
   a. 0.06% b. 0.7%
   c. 1.3% d. 0.040% *

10. Percentage of sulphur in nitriding steels is
    a. 0.05% * b. 1.2%
    c. 4.5% d. 2.9%

11. SAE 1015 is a
    a. carbon steel * b. nickel steel
    c. nickel-chromium steel d. molybdenum steels

12. SAE 2320 is a
    a. carbon steels b. nickel steels *
    c. nickel-chromium steels d. molybdenum steels

13. SAE 3115 is a
    a. carbon steels b. nickel steels
    c. nickel-chromium steel *
    d. molybdenum steels

14. SAE 4037 is a
    a. carbon steels
    b. nickel steels
    c. nickel chromium steel
    d. molybdenum steeel *

15. SAE 6115 is a
    a. carbon steel
    b. nickel steel
    c. nickel-chromium steel
    d. chrome-vanadium steel *

16. Which of the following is not a plain carbon steel ?
    a. SAE 1015 b. SAE 1020
    c. SAE 1025 d. SAE 2320 *

17. Which of the following is not a nickel steel ?
    a. SAE 2515 b. SAE 2330
    c. SAE 2320 d. SAE 4037 *

18. Which of the following is not a nickel-chromium steel ?
    a. SAE 3115 b. SAE 3140
    c. SAE 3250 d. SAE 2515 *

19. Which of the following is not a Molybdenum steels
    a. SAE 4037 b. SAE 4130
    c. SAE 4140 d. SAE 6115 *

20. Which of the following is not a chrome-vanadium steels
    a. SAE 6115 b. SAE 6135
    c. SAE 6150 d. SAE 4140 *

21. Core strength of SAE 6115
    a. 40,000 Psi b. 50,000 Psi
    c. 30,000 Psi d. 90,000 Psi *

22. Ultimate tensile strength of SAE 6135 is
    a. 135,000 Psi * b. 125,000 Psi
    c. 105,000 Psi d. 95,000 Psi

23. Yield strength of SAE 6135 is
    a. 105,000 Psi b. 95,000 Psi
    c. 115,000 Psi * d. 85,000 Psi

24. Elongation of SAE 6135 is about
    a. 10% b. 15% *
    c. 25% d. 35%

25. Ultimate tensile strength of SAE 6150 is
    a. 220,000 Psi * b. 230,000 Psi
    c. 210,000 Psi d. 200,000 Psi

26. Yield strength of SAE 6150 is
a. 150,000 Psi * b. 160,000 Psi
c. 100,000 Psi d. 250,000 Psi

27. Elongation of SAE 6150 is
a. 10% b. 6% *
c. 15% d. 9%

28. Ultimate tensile strength of silicon-chromium steel is
a. 200,000 Psi * b. 100,000 Psi
c. 250,000 Psi d. 300,000 Psi

29. Yield strength of silicon-chromium steel is
a. 250,000 Psi b. 150,000 Psi *
c. 300,000 Psi d. 200,000 Psi

30. Elongation of silicon-chromium steel is
a. 5% b. 6% *
c. 7% d. 8%

31. The percentage of carbon present in austenitic manganese steel is
a. 1.00 to 1.40% * b. 2 to 2.4%
c. 2.4 to 3.6% d. none

32. Percentage of manganese present in austenitic-manganese steels is
a. 10% * b. 20%
c. 15% d. 30%

33. Percentage of phosphorous present in austenitic-manganese steel is
a. 0.100 * b. 0.200
c. 0.300 d. 0.400

34. Percentage of sulphur present in austenitic manganese steel is
a. 0.050% * b. 0.04%
c. 0.4 d. 4.5%

35. Percentage of carbon present in SAE 1015 is
a. 0.05 to 0.2 * b. 0.5 to 2.5
c. 2.5 to 2.6 d. 0.5 to 0.9

36. Percentage of manganese present in SAE 1015 is
a. 0.3 to 0.5 b. 0.3 to 0.6 *
c. 0.3 to 0.9 d. 0.25 to 0.75

37. Percentage of phosphorous present in SAE 1015 is
a. 0.05 b. 0.06
c. 0.045 * d. 0.035

38. Percentage of sulphur present in SAE 1015 is
a. 0.55 * b. 0.6
c. 0.7 d. 0.65

39. The carbon present in SAE 1020 is
a. 0.18 to 0.23% * b. 0.9 to 1.2%
c. 0.15 to 0.17% d. 0.17 to 0.18%

40. The manganese present in SAE 1020 is
a. 0.30 to 0.50% *
b. 0.20 to 0.30%
c. 0.40 to 0.6%
d. 0.45 to 0.95%

41. Phosphorus present in SAE 1020 is
a. 0.04% * b. 0.05%
c. 0.06% d. 0.08%

42. Sulphur present in SAE 1020 is
a. 0.050% * b. 0.060%
c. 0.45% d. 0.055%

43. Carbon present in SAE 1025 is
a. 0.22 to 0.28% * b. 0.42 to 0.62%
c. 0.12 to 0.32% d. 0.22 to 0.32%

44. Manganese present in SAE 1025 is
a. 0.3 to 0.5 * b. 0.25 to 0.35
c. 0.25 to 0.75 d. 0.35 to 0.45

45. Phosphorus present in SAE 1025 is
a. 0.40% * b. 0.6%
c. 0.75% d. 0.65%

46. Sulphur present in SAE 1025 is
a. 0.50% * b. 0.60%
c. 0.40% d. 0.35%

47. Carbon present in SAE 1035 is
a. 0.32 to 0.38 * b. 0.3 to 0.35
c. 0.42 to 0.45 d. 0.45 to 0.55

48. Manganese present in SAE 1035 is
a. 0.60 to 0.90 * b. 0.60 to 0.90
c. 0.5 to 0.8 d. 0.45 to 0.65

49. Phosphorus present in SAE 1035 is
a. 0.45% b. 0.040% *
c. 0.35% d. 0.035%

50. Sulphur present in SAE 1035 is
a. 0.050% * b. 0.055%
c. 0.045% d. 0.65%

51. Which of the following steels have carbon in highest proportion ?
a. SAE 1015 b. SAE 1020
c. SAE 1025 d. SAE 1035 *

52. Which of the following steels have carbon in lowest proportion ?
a. SAE 1015 * b. SAE 1020
c. SAE 1025 d. SAE 1035

53. Which steels has least manganese?
a. SAE 1015 b. SAE 1020
c. SAE 1035 d. SAE 1095 *

54. Which steels has highest percentage of manganese?
a. SAE 1015 b. SAE 1020
c. SAE 1035 * d. SAE 1095

55. Which of the following steels has highest phosphorus?
a. SAE 1015 * b. SAE 1020
c. SAE 1025 d. SAE 1035

56. Which of the following steel has highest sulphur ?
a. SAE 1015 * b. SAE 1020
c. SAE 1025 d. SAE 1035

57. The carbon present in SAE 2320 is
a. 0.15 to 0.25 * b. 0.10 to 0.35
c. 0.25 to 0.75 d. 0.35 to 0.75

58. Manganese present in SAE 2320 is
a. 0.3 to 0.6% * b. 0.25 to 0.75%
c. 0.2 to 0.4% d. 0.4 to 0.6%

59. Phosphorus present in SAE 2320 is
a. 0.4% b. 0.04% *
c. 0.25% d. 0.075%

60. Sulphur present in SAE 2320 is
a. 0.050% * b. 0.06%
c. 0.04% d. 0.02%

61. Carbon present in SAE 2320 is
a. 0.15 to 0.25 * b. 0.25 to 0.50
c. 0.25 to 0.35 d. 0.35 to 0.75

62. Manganese present in SAE 2320 is
a. 0.6 to 0.80% * b. 0.4 to 0.6%
c. 0.4 to 0.45% d. none

63. Which of the following steel is known as hadfield's manganese steel ?
a. nitriding steel
b. austenitic manganese steel *
c. silicon-chromium steel
d. SAE 9260

64. Which of the following is not a chrome-vanadium steels ?
a. SAE 6115 b. SAE 6135
c. SAE 6150 d. SAE 4615 *

65. Which of the following is true for the steel SAE 4615?
a. best carburizing steels
b. very fine grain
c. requires only one quench to develop satisfactory properties
d. all the above *

66. Core strength of SAE 4615 is
a. 80,000 to 100,000 Psi *
b. 50,000 to 80,000 Psi
c. 30,000 to 50,000 Psi
d. 100,000 to 120,000 Psi

67. Ultimate tensile strength of SAE 4135 is
a. 200,000 Psi * b. 150,000 Psi
c. 100,000 Psi d. 50,000 Psi

68. Yield strength of SAE 4135 is
a. 165,000 Psi * b. 155,000 Psi
c. 145,000 Psi d. 250,000 Psi

69. Elongation of SAE 4135 is
a. 5% b. 7% *
c. 8% d. 9%

70. Ultimate tensile strength of SAE 4140 is
a. 85,000 Psi * b. 75,000 Psi
c. 55,000 Psi d. 65,000 Psi

71. Yield strength of SAE 4140 is
a. 75,000 Psi b. 85,000 Psi
c. 65,000 Psi * d. 55,000 Psi

72. Heat treatment of SAE 4140 steel machines is possible upto
a. 150,000 Psi b. 100,000 Psi *
c. 200,000 Psi d. 250,000 Psi

73. Phosphorus present in SAE 2330 is
a. 0.04% * b. 0.05%
c. 0.055% d. 0.06%

74. Sulphur presents in SAE 2330 is
a. 0.04% * b. 0.05%
c. 0.03% d. 0.02%

75. Nickel present in SAE 2320 is
a. 3.25 to 3.75% * b. 2 to 4%
c. 2.5 to 4.5% d. 3.2 to 3.6%

76. Nickel present in SAE 2330
a. 3.25 to 3.75% * b. 3.2 to 4.2%
c. 3.2 to 3.4% d. 2.5 to 7.5%

77. Nickel present in SAE 2515 is
a. 4.75 to 5.25% * b. 4.25 to 4.75%
c. 4.2 to 4.5% d. 3.25 to 3.5

78. Nickel present in SAE 3115 is
a. 1.00 to 1.50 * b. 1.25 to 1.50
c. 1.50 to 1.75 d. 1.50 to 1.60

79. Nickel present in SAE 3140 is
a. 1.50 to 1.75 b. 1.25 to 1.50
c. 1.00 to 1.50 * d. 1.25 to 1.75

80. Nickel present in SAE 3250 is
a. 1.50 to 2.00% * b. 1.5 to 2.5%
c. 2.00 to 2.5% d. 1.5 to 3.5%

81. Nickel present in SAE 3312 is
a. 3.25 to 3.75% * b. 3.20 to 4.20%
c. 2.35 to 3.25% d. 4.25 to 5.25%

82. Which of the following steels has nickel in highest proportion ?
a. SAE 2320 b. SAE 2330
c. SAE 2515 * d. none

83. Which of the following steels has nickel in lowest proportion ?
a. SAE 2320 * b. SAE 2330
c. SAE 2515 d. none

84. Chromium present in SAE 3115 is
a. 0.45 to 0.75 * b. 0.55 to 0.65
c. 0.58 to 0.65 d. none

85. Chromium present in SAE 3140 is
a. 0.55 to 0.65 b. 0.45 to 0.75 *
c. 0.65 to 0.85 d. 0.55 to 0.65

86. Chromium present in SAE 3250 is
a. 0.90 to 1.25% * b. 0.80 to 1.35%
c. 0.75 to 1.50% d. 0.95 to 1.25%

87. Chromium present in SAE 3312 is
a. 1.25 to 1.75% b. 1.5 to 2.5%
c. 1.3 to 1.7% * d. 1.4 to 1.6%

88. Which of the following steels have least molybdenum?
a. SAE 4130 b. SAE 4135
c. SAE 4140 d. both b. and c.*

89. Which of the following steels have highest molybdenum ?
a. SAE 4130 * b. SAE 4136
c. SAE 4140 d. SAE 4340

90. Molybdenum present in SAE 4037 is
a. 0.15 to 0.35% b. 0.15 to 0.25% *
c. 0.25 to 0.35 d. none

91. Molybdenum present in SAE 4130 is
a. 0.20 to 0.30% * b. 0.30 to 0.40%
c. 0.03 to 0.40% d. 0.4 to 0.5%

92. Molybdenum present in SAE 4135
a. 0.15 to 0.25 * b. 0.25 to 0.35
c. 0.25 to 0.45 d. 0.35 to 0.55

93. Molybdenum present in SAE 4140 is
a. 0.25 to 0.35 b. 0.15 to 0.25 *
c. 0.35 to 0.45 d. 0.25 to 0.49

94. Molybdenum present in SAE 4340 is
a. 0.20 to 0.30% * b. 0.3 to 0.4%
c. 0.3 to 0.5% d. none

95. Molybdenum present in SAE 4615
a. 0.25 to 0.035% b. 0.2 to 0.3% *
c. 0.3 to 0.5% d. none

96. Vanadium presence, in which of the following steel is highest ?
a. SAE 6115 b. SAE 6135 *
c. SAE 6150 d. SAE 6150

97. Vanadium presence, lowest in which of the steel is lowest
a. SAE 6135 b. SAE 6115
c. SAE 6150 d. both b. & c. *

■■■

CHAPTER - 11
CARBON STEELS

1. Strength of carbon steel depends upon
   a. carbon percentage
   b. micro structure
   c. both b. & c. *
   d. none of the above

2. Carbon tool steels contains carbon percentage of
   a. 0.25 - 0.6% b. 0.6 - 0.8%
   c. 0.8 - 1.1% * d. up to 0.25%

3. Mild carbon steel contain carbon percentage of
   a. 0.25 - 0.6% b. 0.8 - 1.1%
   c. 0.6 - 0.8% d. up to 0.25% *

4. Medium carbon steel contain carbon percentage of
   a. up to 0.25%
   b. 0.5 - 0.6% *
   c. 0.6 - 0.8%
   d. 0.8 - 1.1%

5. High carbon steels contains carbon percentage of
   a. up to 0.25%
   b. 0.25 - 0.6%
   c. 0.6 - 0.8% *
   d. 0.8 - 1.1%

6. Of the indian system for representation of carbon steel is
   a. -C followed by a number indicates approximate carbon content of steel in $1/100^{th}$ percentage *
   b. as in a., letter prefixed to 'C' denotes that the steel is rebined varaity
   c. a four digit number
   d. a single letter followed by 5 numerals

7. A seven digit code representation of steel (carbon) is used in
   a. russian system
   b. french system
   c. german system *
   d. american system

8. Uppercase letter JIS steel specification is used in
   a. american system
   b. russian system
   c. japanese system *
   d. german system

9. UNS stands for
   a. universal number system
   b. united nations system
   c. unified numbering system *
   d. unique number system

10. Tool steel in russian system for steel representation is abrevated as
    a. A
    b. X
    c. U *
    d. SC

11. SS_{14} abrevation for carbon steel used in
    a. Russian system *
    b. Americal system
    c. Indian system
    d. Swedish system

12. UNI prefix for representation of carbon steel is used in
    a. Russian system
    b. Swedish systemm *
    c. Itallian system
    d. British system

13. 'S' followed by a product form code is a representation for carbon steel in
    a. Ammerican system
    b. Russian system
    c. British system *
    d. Swedish system

14. AMS stands for
    a. aerospace maintainence system
    b. aerospace material specification *
    c. aerospace material selection
    d. aeronautic material system

15. The letter 'G' used for carbon steel specification mostly in
    a. Indian system b. ammerican system
    c. russian system d. japanese system *

16. BCC iron is stable
    a. below 910^0 C *
    b. above 1401^0 C
    c. both b & c
    d. none of the above

17. FCC is stable
    a. above 910^0 C
    b. below 1401^0 C
    c. between 910^0 C to 1401^0 C *
    d. outside of a. & b.

18. FCC iron is
    a. α iron b. δ iron
    c. β iron d. γ iron *

19. At 910^0 C
    a. BCC, FCC forms co-emits exists *
    b. BCC & BCC form coexist
    c. FCC & FCC form coexit
    d. none of above

20. At 768^0 C
    a. BCC - FCC form co exists
    b. BCC - BCC form co exists *
    c. FCC - FCC form co exists
    d. none of the above

21. In cooling curve at pure iron [6] curie temperature stands for
    a. 1401^0 C
    b. 768^0 C *
    c. 910^0 C
    d. 1539^0 C

22. In steel the carbon percentage is
    a. up to 2% *
    b. above 2%
    c. 0 percent
    d. none of the above

23. In cast iron the carbon percentage is
    a. less than 2%
    b. up to 2%
    c. more than 2% *
    d. equal to 2%

24. Hypoetectoid steel contains carbon percent
    a. >0.8%
    b. =0.8%
    c. <0.8% *
    d. none of the above

25. Eutectoid steels contains carbon
    a. >0.8%
    b. =0.8% *
    c. <0.8%
    d. none of the above

26. Hyper eutectoid steels contains carbon percentage
    a. >0.8% *
    b. =0.8%
    c. <0.8%
    d. none of the above

27. Nuclius of carbon is __________ that of iron
    a. more
    b. less than *
    c. equal to
    d. none of the above

28. Cementite (fe_3C) is
    a. metastable fe - C compound *
    b. eutectic mixture of austenite & cementite
    c. eutectoid mixture of a ferrite & cementite
    d. aggregate of ferrite and cementite

29. Ledeburite is
    a. metastable fe-C compound *
    b. eutectic mixture of austinite and cementite
    c. eutectoid mixture at α - berrite & cementite
    d. agreegate of mixture of ferrite & cementite

30. Bainite is
    a. Metastable Fe-C compound
    b. eutectic mixture of austinite & cementite *
    c. eutectoid mixture of α ferrite & cementite
    d. agreegate of ferrite & cementite

31. Martensite is
    a. metastable Fe-C compound
    b. eutectic mixture of austinite & cementite
    c. eutectoid mixture of ferrite & carbon
    d. super saturated solid solution at carbon tropped in a body centre tetragonal (BCT). *

32. Spheroidized structure benefited for
    a. maximum hardness
    b. maximum ductility
    c. maximum machinability *
    d. all of the above

33. Electrical & magnetic properties are improved by means of
    a. annealing
    b. spheroidzing *
    c. both of the above
    d. none of the above

34. The process of nucleation stands for
    a. γ - γ tarfarmation
    b. γ - α transformation *
    c. α - γ tarfarmation
    d. α - α transformation

35. A small amount of phosphorous added in ferrite
    a. increases the strength
    b. increases the hardness
    c. increases the strength but decreases the hardness*
    d. both a. & b.

36. A large amount of phosphorous in ferrite
    a. decreases the ductility
    b. induces cold shortness
    c. none of the above
    d. both a. & b. *

37. Which of following are consumable electrode remelting furnances
    a. vaccum arc remelting
    b. electroslag remelting
    c. both of the above *
    d. none of the above

38. Hot working process includes
    a. forging only
    b. rolling only
    c. both a. & b. *
    d. none of the above

39. ESR starts for
    a. entire slag remelting
    b. electro slag remelting *
    c. electro slag removing
    d. electro slag refining

40. Isothermal depicts
 a. phase changes at contant temperature *
 b. phase changes at variable temperature
 c. temperature changes at various phase
 d. constant temperature at constant phase

41. Railway rails contain nominal W% carbon
 a. 0.5 - 0.65 *
 b. 0.4 - 0.5
 c. 0.65 - 0.75
 d. 0.85 - 0.9

42. Punches & shear blades contain the carbon percentage
 a. 0.5 - 0.65
 b. 0.85 - 0.9 *
 c. 0.95 - 1.1
 d. 1.1 - 1.4

43. Screwing dies, axes, milling etc contain carbon percentage
 a. 0.5 - 0.65
 b. 0.85 - 0.9
 c. 0.95 - 1.1 *
 d. 1.1 - 1.4

44. Fatigue life of bearing steels improved by
 a. sulphur *
 b. phosphorus
 c. manganese
 d. silicon

45. Soundness in casting is improved by
 a. sulphur
 b. phosphorus
 c. manganese
 d. silicon *

46. Excess 'Mn' contents in steel
 a. increases tandency towards cracking *
 b. decreases ductility
 c. induces cold shortness
 d. all of the above

47. AISI stands for
 a. american international steel & iron
 b. american iron & steel international
 c. american iron and steel institute *
 d. none of the above

48. SAE stands for
 a. society of aviation engineer
 b. society of aeronautic electronics
 c. society of automotive engineer *
 d. society of automotive electronics

49. The first digit - I in AISI SAE stands for
 a. carbon manganese *
 b. nickel steel
 c. nickel cadmium steel
 d. molybdenum steel

50. The first digit 3 in AISI-SAE stands for
 a. carbon manganese
 b. nickel steel
 c. nickel cadmium steel *
 d. molybdenum steel

51. The 2nd digid 2 in AISI-SAE stands for
 a. the content of material
 b. approximate percentage of predominant alloy element *
 c. approximate carbon percentage
 d. none of the above

52. The last two digits in AISI-SAE stands for
 a. the content of material
 b. approximate carbon percentage *
 c. approximate percentage of predominant alloy
 d. none of the above

53. Which of following is a principal function of aluminium
 a. improves red hardness
 b. increases bainite formation
 c. efficient deoxidiser *
 d. strengthns annealed steel

54. Which of the following improves nitriding capability of steel
 a. aluminium *
 b. chromium
 c. cobalt
 d. manganese

55. Which of the following improves red hardness
 a. cobalt *
 b. aluminium
 c. chromium
 d. manganese

56. Which of the following increases bainite formation
 a. cobalt
 b. manganese
 c. molybdenum *
 d. chromium

57. Which of the following counter acts temper brittleness
 a. cobalt
 b. manganese
 c. molybdenum *
 d. chromium

58. Nickel is added to steel to __________
 a. improve nitride capability of steel
 b. improve red hardness
 c. toughness pearlitic ferritic steels *
 d. none of the above

59. Which of the following with boron increases hardenability
 a. tungsten b. titanium *
 c. chromium d. cobalt

60. Which of the following acts as a scavanger for oxides and increases creep resistance
a. copper b. vanadium *
c. titanium d. tungsten

61. __________ increases resistance to pitting corrosion
a. copper * b. vanadium
c. titanium d. tungsten

62. Good carbide stabiliser is a principal function of
a. copper b. vanadium *
c. titanium d. niobium

63. _________ improves machinability
a. niobium b. lead *
c. boron d. cobalt

64. _________ increases oxidation resistance
a. silicon b. tungsten
c. titanium * d. copper

65. _________ used for principal alloying element in high speed steels
a. titanium b. tungsten *
c. copper d. chromium

66. __________ restricts grain growth during heat treatment
a. vanadium b. copper
c. chromium d. tungsten *

67. __________ controls the shape at inclusions
a. vanadium b. copper
c. zirconium & cerium * d. lead

68. ___________ decreases hardenability
a. zirconium & cerium b. lead
c. copper d. niobium *

69. ____________ increases corrosion resistance
a. molybdenum * b. lead
c. titanium d. niobium

70. Phosphorous
a. good deoxidiser
b. increases succeptibility of steels *
c. improves red hardness
d. increases toughness

71. Lowers critical points to produce magnesite by air cooling is principal function of
a. titanium b. tungsten
c. copper * d. chromium

72. LTMT stands for
a. low temperature material treatment
b. low treatment material temperature
c. low temperature thermo mechanical treatment *
d. none of the above

73. Which of the following not applicable for manganese steel
a. ribs b. spars attachment
c. coil and leaf spring d. gears, splines *

74. For gears, splines and other high strength machined parts in aircraft industry __________used
a. manganese steel
b. nickel chromium steel *
c. nickel steel
d. Cr-V steels

75. For coil & leaf spring _________ used
a. manganese steel * b. nickel chromium steel
c. nickel steel d. Cr-V steel

76. For case hardened parts in aircraft industry __________ is used
a. manganese b. nickel steel *
c. nickel chromium steel d. Cr-V steel

77. Leaf and coil springs are application of
a. silicon-Mn steel * b. chromium silicon steel
c. chromium steel d. manganese steel

78. __________ used for crank shafts, bushings bolts, cross-members
a. Cr-V *
b. Cr-Mo / Cr-Ni-Mo
c. chromium steel
d. chromium-silicon steels

79. __________ used for small machine parts subjected to high stresses and wear
a. Cr-V
b. Cr-Mo
c. chromium steel
d. chromium-silicon steels *

80. __________ used for critical spring
a. Cr-V steels * b. manganese steel
c. chromium steel d. silicon-Mn steel

81. __________ used for fastening parts, high pressure fitting
a. Cr-Mo steel b. Cr-Ni-Mo steel
c. Cr - v steel d. both a. & b. *

82. Gas cylinder and structural plate are made up of
a. BS S 142 * b. 38XMUAW
c. 30XGLAW d. both b & c

83. Supply condition for 20GZ wires is __________
a. annealed * b. hot rolled
c. farged d. cold drawn

84. 16 KHSN wires are
a. annealed b. pre-annealed
c. cold drawn d. both b & c *

85. 30XCA is ___________
a. annealed b. forged *
c. cold drawn d. pre-annealed

86. 30 KHGSA-SSH bar is __________
a. hot rolled b. annealed
c. forged d. both a. & b. *

87. 30 x GCNZA F & HR bars are __________
a. forged b. annealed
c. machined d. b & c *

88. 20 KH4GMA wires are
a. forged b. cold drawn *
c. hot drawn d. annealed

89. 18 KHMA filler wire is
a. cold drawn b. coiled
c. hot drawn d. both a. & b. *

90. 30 KHGSA bars and rods are
a. cold rolled b. hot rolled
c. annealed d. both b & c *

91. MDG LA2 is __________
a. cold rolled b. hot rolled
c. electro slag refining * d. none of the above

92. MON 132A bars & billets for machining are _________
a. annealed
b. machined
c. ground
d. all of the above *

93. ___________ stabilises austentic microstructure
a. nickel * b. nitrogen
c. copper d. tungsten

94. ___________ enhances surface passivity in reducing environment
a. nickel b. nitrogen
c. copper * d. tungsten

95. __________ improves localised corrosion resistance
a. nickel b. copper
c. nitrogen d. tungsten *

96. ___________ improves general corrosion resistance in most non sulphide environment
a. nickel * b. copper
c. nitrogen d. tungsten

97. __________ increases resistance to localised (pitting) corrosion
a. chromium b. molybdenum *
c. copper d. nitrogen

98. __________ increases alloy strength
a. Cu b. W
c. N d. Ni *

99. __________ enhances stability of passive film against local breakdown in aggressive environment
a. Mo * b. Cr
c. N d. Ni

100. _________ increases resistance to localised corrosion particularly in duplex steel
a. N * b. Cr
c. Ni d. Mo

■■■

CHAPTER - 12
ALLOY STEELS

1. An ore with less consumable melting process in which the heat is derived from the electrical resistance heating is called as
   a. rolling b. extrusion
   c. ESR * d. drawing

2. The conversion of ingot or billet into length of uniform cross section by forcing the metal to flow plastically through a die orific by means of a ram is called as
   a. rolling b. extrusion *
   c. ESR d. drawing

3. Process by which crossectional area and/or the shape of rod, bar, tube or wire is reduced by pulling through a die is ___________
   a. rolling b. extrusion *
   c. ESR d. drawing

4. Selection of forging temperature is based up on
   a. alloy composition
   b. carbon content
   c. both a. & b. *
   d. none

5. Forging temperature increases with
   a. increase of carbon content but decrease of alloy content
   b. increase of both carbon content and alloy content*
   c. decrease of carbon content and increase in alloy content
   d. decrease of both carbon content and alloy content

6. Which of the following is not advantage of open hearth furnance practice
   a. removal of phasphorous
   b. control of sulpher
   c. flexibility of operation with cold & hot charges
   d. reduction of dissolved gases *

7. Elimination of segmentation and dissolved gases is chief advantage of
   a. electric melting practice *
   b. induction furnance practice
   c. open hearth furnance practice
   d. are furnance practice

8. Prolonged holding of liquid metal without appreciable change in composition is an advantage of
   a. electric melting practice *
   b. induction furnance practice
   c. open hearth furnance practice
   d. arc furnance practice

9. Control of melt chemistry and homogenity are the chief advantage of
   a. electric melting practice
   b. induction furnance practice *
   c. open hearth furnance practice
   d. arc furnance practice

10. VIM stands for
    a. voltage induction melting
    b. voltage current melting
    c. vaccum current melting
    d. vaccum induction melting *

11. Vaccum arc melting (VAR) belong to
    a. electric melting practice
    b. arc furnace practice *
    c. induction melting practice
    d. open hearth furnace practice

12. Vigorous stirring of melt is achieved in ___________
    a. electric melting practice
    b. arc furnace practice
    c. induction furnace practice *
    d. open hearth furnace practice

13. Which of following is true for extrusion
    a. horizontal presses are used only
    b. vertical presses are used only
    c. both a. & b. are used *
    d. none of the above

14. In flame hardening depth of martensitic zone is controlled by
    a. adjusting the flame intensity
    b. heating time
    c. speed of travel
    d. all of the above *

15. Austempering is
    a. isothermal transformation of bainite into austenite
    b. adiabatic transformation of bainite into austenite
    c. isothermal transformation of austinite into bainite*
    d. adiabatic transformation of austinite into bainite

16. Hard and wear resistanie surface are produced by
    a. case hardening heat treatment *
    b. modified martempering
    c. austempering
    d. none

17. _________ produces structure that is more succeptible to spheroidisation during subsequent annealing treatments
a. normalising *
b. annealing
c. hardening & tempering
d. none

18. To obtain a specific microstructure in alloy
a. annealing temperature should precisely mentioned
b. cooling condition should mentioned precisely
c. none
d. both a. & b. *

19. The differential martensitic transformation within same section obtained in
a. martempering * b. austempering
c. both a. & b. d. none

20. In which of following the ram and die are at opposite ends of the billet
a. extrusion * b. drawing
c. rolling d. none

21. In forging the steels are preheated upto _______ ^{0} C
a. 650^0C b. 750^0C *
c. 850^0C d. 950^0C

22. Maximum text limit for sulphide A, thin is
a. 1 b. 1.5
c. 2 * d. 2.5

23. Maximum test limit for sulphide A heavy
a. 1 b. 1.5 *
c. 2 d. 2.5

24. Far thin aluminium β the maximum test limit is
a. 2.0 b. 1.5 *
c. 2.5 d. 2

25. Far heavy aluminium β the maximum test limit is
a. 2.0 b. 1.5 *
c. 1 d. 2

26. The maximum test limit for silicate C thin is
a. 2. 5 * b. 1.5
c. 1 d. 2

27. The maximum test limit for silicate C heavy is
a. 2.5 b. 1.5 *
c. 1 d. 2

28. For heavy Globular oxide D, the maximum text limit is
a. 2.0 b. 2.5
c. 1.5 * d. 1

29. Far thin gobular oxides D, the maximum text limit is
a. 2.0 * b. 2.5
c. 1.5 d. 1.0

30. Which of the following alloys is not used for aircraft frame
a. 20GZ b. 38KHA
c. 40KH d. 20KH4GMA *

31. Which of following alloy is not used for aircraft fasteners
a. 30KHGSA-SSH b. 30KHGSNA
c. 20GZ * d. 30KHGSA

32. Which of the following is not a supply condition for rod
a. hot rolled b. normalised
c. annealed d. softened *

33. Which of following are not supply condition far bars for working
a. hardened b. tempered
c. softened d. all of the above *

34. _________ grade applied for aircraft hydroulic fluid system
a. 304 b. 304L
c. both a. and b. * d. 316

35. For exhaust manifolds the application of grade is _________
a. 316 b. 317
c. both a. and b. * d. 430

36. __________ grade used for railings, helicals and flat springs
a. 17 - 7 PH * b. 17 - 4 PH
c. 430 d. 430F

37. __________ grade is used for valves, shafts fittings, splines and gears
a. 17 - 7 PH b. 17 - 4 PH *
c. MDN 59A d. 304 & 30 HL

38. __________ grade is used for heat exchangers in chemical, power and other industries.
a. 329, 7MO * b. MDN 59A
c. 17 - 7PH d. 17 - 4PH

39. Nitric acid tanks, annealing baskets are application of grade _________.
a. 430 & 430F * b. 321, 347, 348
c. 316 & 317 d. 304 & 340AL

40. Aircraft collector rings are application of grade _________.
a. 304 & 304L b. 316 & 317 *
c. 321, 347, 348 d. 430 & 430F

41. __________ grade is applied as for locking rings, washers, panels and fuel tanks
a. AE 961W b. 201
c. AE96 2W * d. 302

42. ___________ grade is applied for turbine parts blades and highly stressed forgings
a. 403 * b. 422
c. 431 d. AE 961W

43. For aerospace pistons, nipples __________grade is used.
a. AE 962W b. AE 961W
c. 14 x 17H2 * d. Z1 2CNV12

44. For aerospace cowling ___________ grade is used
a. 302 * b. 201
c. 422 d. 431

45. For manufacture of blades and other components of aeroengine structural components __________ grade is used
a. Z12 CNDV12 * b. AE 961W
c. 14 x 17 HR d. 201 and 302

46. Body rivets, spacer and plate manufacturing are the application of
a. MDN 347A * b. MDN 321A
c. 12 x 18 HIOT d. all of the above

47. High temperature welded components are the major application of
a. MDN 347A b. MDN 321A
c. 12 x 18 HIOT d. both a. & b. *

48. Turbine lock is a major application of
a. MDN 347A b. MDN 321A
c. 12 x 18 HIOT * d. all of the above

49. Outer combustion chamber is manufactured by using __________ alloy.
a. MDN 347A b. MDN 321A
c. 12 x 18 HIOT * d. none of the above

50. Collar, pins are major application of __________ alloy.
a. MDN 347A b. MDN 321A *
c. 12 x 18 HIOT d. all of the above

51. Which of the following alloy is not used for high temperature welding part components
a. MDN 347A * b. MDN 321A
c. 12 x 18 HIOT d. all of the above

52. The basis of all steels is
a. iron * b. carbon
c. bronze d. sulphur

53. Which of the following is essential to obtain a high grade steel for aircraft use
a. carbon should be mixed
b. sulphur should be added
c. exact control of the alloying elements *
d. none of the above

54. The most important element in steel is
a. iron b. carbon *
c. bronze d. none

55. The percentage of carbon present in the wrought iron is
a. 0.08% * b. 4%
c. 0.02% d. 0.2%

56. The percentage of carbon present in the low carbon steel is
a. 0.10% to 0.90% b. 0.10% to 0.30% *
c. 1.2% to 1.6% d. 1.7% to 2.9%

57. The percentage of carbon present in medium carbon steel is
a. 0.30% to 0.40% b. 0.30% to 0.70% *
c. 0.45% to 0.65% d. 1.2% to 3.5%

58. The percentage of carbon present in high carbon steel is
a. 0.70% to 2.2% * b. 0.23% to 0.45%
c. 2.5% to 3.1% d. 0.10% to 0.30%

59. The percentage of carbon present in the cast iron
a. 0.70% to 2.2% b. 0.30% to 0.70%
c. 2.2% to 4.5% * d. 2.5% to 3.5%

60. Which of the following metals contains lowest percentage of carbon
a. cast iron b. wrought iron *
c. medium carbon steel d. high carbon steel

61. Which of the following materials contains highest percentage of carbon
a. cast iron *
b. wrought iron
c. medium carbon steel
d. high carbon steel

62. Besides iron and carbon the plain carbon steels normally contain small amounts of ___________.
a. silicon b. sulphur
c. phosphorous d. all of the above *

63. Which of the following are beneficial elements in the steel
a. silicon b. manganese
c. either a. or b. d. both a. or b. *

64. Which of the following are the harmful impurities in the steel
a. sulphur b. phosphorous
c. either a. or b. d. both a. and b. *

65. Which of the following elements are kept as low as possible
a. sulphur b. phosphorous
c. silicon d. both a. and b. *

66. The metals commonly used as alloys in steel
a. nickel b. chromium
c. molybdenum d. all of the above *

67. In corrosion resisting steels, which of the following metals are essentially used ?
a. nickel b. titanium
c. columbium d. both b. and c. *

68. Alloy steel which is commonly used for propeller hubs is
a. chromium-nickel-molybdenum *
b. chromium-nickel
c. chromium-molybdenum
d. none of these

69. For springs, which steels are used ?
a. low carbon steel b. high carbon steel *
c. medium carbon steel d. none of these

70. For formed fittings, which steels are used ?
a. low carbon steel * b. high carbon steel
c. medium carbon steel d. none of these

71. For welded parts, which steels are use?
a. low carbon steel * b. high carbon steel
c. medium carbon steel d. none of these

72. For forged fittings, which steels are used ?
a. low carbon steel b. high carbon steel
c. medium carbon steel * d. none of these

73. For tie rods, which of the following steels are used?
a. low carbon steels b. medium carbon steel *
c. high carbon steel d. none of the above

74. Purpose of which of the following materials is to deoxidize and desulphurize the steel to produce a clean, tough metal ?
a. carbon b. calcium
c. silicon d. manganese *

75. Manganese deoxidizes by eliminating ___________.
a. ferrous oxide * b. non-ferrous oxide
c. calcium oxide d. calcium cyanide

76. Which of the following is less harmful ?
a. sulphur b. phosphorous
c. manganese sulphide * d. none of these

77. The presence of which of the material improves the forging qualities of the steel ?
a. manganese * b. phosphorous
c. sulphur d. none of these

78. An excess of more than __________ of manganese will increase the brittleness.
a. 1% * b. 2%
c. 1.5% d. 2.5%

79. Manganese steel contain a ___________ of manganese
a. 11% b. 12%
c. 13% * d. 17%

80. The percentage of silicon in the steel is normally is
a. 0.3% * b. 3%
c. 1.2% d. 0.025%

81. Silicon improves ____________.
a. ductility * b. hardness
c. brittleness d. elasticity

82. Which steels has good impact resistance
a. silico-manganese steels *
b. low carbon steels
c. high carbon steels
d. medium carbon steels

83. The percentage of sulphur contains in the steel should be limited to ___________.
a. 0.6% b. 0.34%
c. 0.06% * d. 1.5%

84. The percentage of phosphorus contains in steel should be limited to
a. 0.06% b. 0.35%
c. 0.05% * d. 0.5%

85. Small amount of phosphorus adds in the steel ___________.
a. ductility b. strength *
c. hardness d. elasticity

86. Which of the following metals is as bright as silver?
a. manganese b. nickel *
c. calcium d. sulphur

87. In the pure state nickel is
a. malleable b. ductile
c. weldable d. all of the above *

88. Nickel steels contain ___________ of nickel.
a. 2 to 10% b. 3 to 5% *
c. 10 to 15% d. 20 to 25%

89. The addition of nickel to steels increases
a. strength b. yield point
c. hardness d. all of the above *

90. The presence of which materials in steel slow down the critical rate of hardening during heat treatment?
a. manganese b. nickel *
c. calcium d. molybdenum

91. Which of the following metals increases the corrosion resistance of the steel ?
a. manganese b. nickel *
c. calcium d. molybdenum

92. Which of the following metals imparts hardness, strength, wear resistance and corrosion resistance to steel
    a. chromium * b. nickel
    c. calcium d. molybdenum

93. Corrosion resisting steels contain ___________ amount of chromium.
    a. very small b. small
    c. large * d. medium

94. Chromium is a ____________ metal.
    a. soft gray b. hard gray *
    c. hard red d. hard white

95. Chromium has ___________ melting point.
    a. low b. medium
    c. high * d. moderate

96. For ball bearing which alloy is used ?
    a. chrome-vanadium alloy *
    b. chromium alloy
    c. cast iron
    d. wrought iron

97. Most common steels containt ___________ percentage of chromium.
    a. 18% * b. 28%
    c. 118% d. 20%

98. Molybdenum improves the ____________ of the metal.
    a. hardness b. brittleness
    c. elasticity d. homogeneity *

99. Molybdenum reduces ___________.
    a. hardness b. brittleness
    c. elasticity d. grain size *

100. Molybdenum increases __________.
    a. elastic limit * b. corrosion resistivity
    c. hardness d. none of the above

101. Molybdenum improves ___________.
    a. impact value * b. hardness
    c. brittleness d. none of the above

102. Molybdenum improves ___________.
    a. impact value b. hardness *
    c. brittleness d. none of the above

103. Which of the following is most expensive metals ?
    a. maganesium b. sulphur
    c. phosphorous d. vanadium *

104. Percentage of vanadium in steel is
    a. 0.20% * b. 0.30%
    c. 0.35% d. 0.45%

105. Vanadium improves ___________.
    a. grain structure * b. hardness
    c. brittleness d. ductility

106. Vanadium improves ___________.
    a. grain structure b. fatigue strength
    c. hardness d. both a. & b. *

107. Vanadium increases
    a. ultimate strength b. yield point
    c. toughness d. all the above *

108. In chrome-vanadium alloys, the percentage of chromium is
    a. 5% b. 2%
    c. 1% * d. 10%

109. Chrome-vanadium alloy has
    a. good ductility b. high strength
    c. either a. or b. d. both a. and b. *

110. Tool steel contains __________ tungsten.
    a. 15 to 35% b. 14 to 18% *
    c. 10 to 20% d. 20 to 35%

111. Tool steel contains ___________ of chromium.
    a. 2 to 4% * b. 3 to 5%
    c. 5 to 10% d. 0.2 to 0.8%

112. Red hardness is the property of the
    a. manganese b. tungsten *
    c. titanium d. vanadium

113. High speed steel is a ___________.
    a. nickel chromium alloy
    b. tungsten chromium steel *
    c. cast iron
    d. nickel molybdenum

114. Titanium is added to steel in small amount to reduce ___________.
    a. embrittlement * b. hardness
    c. elasticity d. ductility

115. '2340' indicates a nickel steel of approximately __________ of nickle.
    a. 2% b. 3% *
    c. 4% d. 5%

116. '2340' indicates a nickel steel of approximately ___________ of carbon.
    a. 0.40% * b. 0.50%
    c. 0.60% d. 0.80%

■■■

CHAPTER - 13
STAINLESS STEELS &
HEAT RESISTANT STEELS

1. Steel alloyed with chromium of __________ % have possitive corossion potential and provides corosion resistance.
   a. >12% * b. <12%
   c. =12% d. none

2. Above 12% alloyed with which of following element steel provides more resistance to rusting and staining than plane carbon
   a. aluminium b. chromium *
   c. copper d. silver

3. In UNS system the steel is represented by s followed by _________ digits.
   a. 2 b. 3
   c. 4 * d. 5

4. If the steel is represented by upper case letter DIN then it belongs to
   a. american system of representation
   b. french system of representation
   c. german system of representation *
   d. all of the above

5. The steel generally contains
   a. 12 - 19% of Cr b. 12 - 17% of Cr *
   c. 12 - 20% of Cr` d. 12 - 25% of Cr

6. The steel contain _________ % of Ni
   a. 5-6% b. 0-5%
   c. 0-4% * d. 0-6%

7. Which of following are not used in alloy steel
   a. Mo b. V
   c. Nb d. none *

8. A steel generally contains __________% of carbon.
   a. 0.1-0.2% b. 0.1-1.0% *
   c. >1% d. =1%

9. Which of the following type of steel are used generally with aerospace spare parts
   a. 410 b. 416
   c. 431 d. all of above

10. Most common austenitic steels contain __________% Cr.
    a. 18-25% * b. 18-26%
    c. 12-28% d. 10-24%

11. Most common austenutic steels contain __________% of Ni
    a. 0-20% b. 8-20% *
    c. 8-25% d. 10-30%

12. Maximum percentage of Mn in austinitic steels are
    a. 0-20% b. 0-10%
    c. 0-15% * d. 0-5%

13. Ferrite steel contains __________% of Cr.
    a. 14-20 b. 14-25
    c. 14-15 d. 14-27 *

14. Austinitic steel result in
    a. improved shock resistance and improved machinability
    b. improved shock resistance but poor machinebility*
    c. poor shock resistance but improved machinability
    d. poor shock resistance and poor machinability

15. Which of following is not an advantage of higher chromium content in ferrite steel
    a. maximum softness
    b. ductility increases
    c. more corossion resistant
    d. impart brittleness *

16. Which of following elements are added along with Cr in ferrite steel
    a. Mo b. Nb
    c. Ti d. all of the above *

17. The austinite steel in general are
    a. magnetic material b. non-magnetic material *
    c. either a. or b. d. none of the above

18. Duplex steel contain __________ % of chromium.
    a. 15-25% b. 18-28% *
    c. 10-30% d. 16-26%

19. Duplex steel contain _________ % of Ni.
    a. 2.5-5.5 b. 1.5-4.5
    c. 2.5-6.5 * d. 2.5-7.5

20. Duplex steel contain _________ % of Mo
    a. 1-4 * b. 1-5
    c. 1-6 d. 1-7

21. When 0.1% C added to 18-8steels the alloy is fully austinitie
    a. above 900^0 C * b. below 900^0 C
    c. at 900^0 C d. none of the above

22. The general formula for x phase , bcc α -Mn type crystal structure is
    a. $A_{10}B_{40}$ b. $A_{10}B_{48}$ *
    c. $A_{10}B_{45}$ d. $A_{10}B_{46}$

23. α -ores (η) phase Fcc structure belongs to type __________.
    a. C_{14} b. C_{15}
    c. C_{12} d. both a. & b.*

24. At higher temperature delta ferrite transforms to austinite by
    a. diffussion process * b. fussion process
    c. isolation d. none

25. The main cause of δ-ferrite formation is
    a. variation in chemistry
    b. excessive heat treatment
    c. both a. & b. *
    d. none of the above

26. At low temperature the formation of [27] in austenite by
    a. simultaneous growth of carbides
    b. simultaneous growth of austinite only
    c. both a. & b. *
    d. none of the above

27. Which of following not belongs to carbide
    a. M_3C b. M_7C_3
    c. $M_{23}C_6$ d. none of the above *

28. $M_{23}C_6$ forms at temperature __________ ^{0} C.
    a. 300 b. 380
    c. 400 d. 480 *

29. $M_{23}C_6$ is predominated above __________ ^{0} C.
    a. 380^0 C b. 440^0 C
    c. 480^0 C d. 540^0 C *

30. Cr-Fe alpha (α) solid solution is having __________ crystal structure
    a. FCC b. BCC *
    c. both a. & b. d. None

31. Steels containing Ni, Mo & Mn may require __________ for dissolve in sigma phase
    a. smaller soaking b. higher temperature
    c. both a. & b. * d. none of the above

32. The ferrite stain less steel having 15 to 70 wt% Cr is heated between 400 and 540 to yield
    a. increase in hardness
    b. increase in tensile strength
    c. decrease in ductility
    d. all of the above *

33. High-chromium ferrite steels containing moderate to high-carbon & nitrogen levels and exposure to high temperature and then cooling to room temperature yields
    a. loss of ductility *
    b. increase in ductility
    c. increase in corrosion resistance
    d. none of the above

34. Annealing results in carbon precipitate between temperature __________ ^{0} C
    a. 600 to 700 b. 700 to 800 *
    c. 800 to 900 d. none of the above

35. Which of the following called as precipitation hardening steels
    a. austenitic b. martensitic
    c. semi austenitic d. all of the above *

36. Maximum strengthening occurs
    a. before vissible particles are produced in pre-precipitation stage *
    b. after vissible particles are formed in the pre-precipitated stage
    c. before vissible particles formed in the post-precipitated stage
    d. all of the above

37. In order to make pro-longed ageing at 705^0 C which of following are not added to austenitic steel
    a. Al b. Ti
    c. P d. none of the above *

38. Which of following belong to austenite
    a. C b. N
    c. Ni d. all of the above *

39. Which of following belong to heat treatment
    a. annealing b. hardening
    c. stress relieving d. all of the above *

40. Which of following called as second phase constituents
    a. carbides
    b. sigma
    c. laves
    d. all of the above *

41. During annealing chromium carbides are dissolved and precipitated between temperature __________ ^{0}C.
    a. 450 to 950^0 C b. 425 to 900^0 C *
    c. 425 to 925^0 C d. $400\text{-}900^0$ C

42. The most common annealing temperature used is __________ ^{0} C.
    a. 1050 b. 1095 *
    c. 900 d. 950

43. Which of following do not belongs to high nitrogen percentage contained austinite
    a. 304N b. 316N
    c. both d. none *

44. In order to diminish sensitisation austenitic grade 317LM & AL-6X contain
    a. low carbon *
    b. high carbon
    c. moderate carbon amount
    d. none of the above

45. Which of following increases the corrosive resistance
a. Cu b. Al
c. Si d. all of the above *

46. Annealing temperature in ^{0} C for duplex austenitic steel SAF 2205 is
a. 1020-1120 b. 1020-1100 *
c. 1000-1100 d. all of the above

47. Highly alloyed austenitic is
a. B17LM b. AL-6X
c. none d. all *

48. Annealilng of martensite 410 is
a. fully isothermal * b. fully idiabatic
c. partly a and partly b d. none

49. Annealing temperature for highly alloyed austenite steel is
a. 1250-1350 b. 1220-1350
c. 1120-1150 * d. none

50. Which of the following annealing treatment are given to martensitic stainless steel
a. full b. isothermal
c. subcritical d. all *

51. Which type of following do not respond to full or isothermal annealing
a. 414 b. 431
c. both a. & b. d. none *

52. CSCC stands for
a. carbon stress corossion cracking
b. chloride stress corossion cracking *
c. chromium stress corossion cracking
d. cadmium stress corossion cracking

53. Which of following belongs to stabilished austinitic grades
a. 321 and 347 * b. 304N and 316N
c. 317 LM d. all of the above

54. Prevention from discoloration of surface is obtained through
a. stabilising anneal b. bright anneal *
c. both d. none

55. Hardening temperature range ^{0} C for grade 410 is
a. 925-1125 b. 925-1110
c. 925-1025 d. 925-1010 *

56. Termpering temperature range for garde AE 961 W is
a. 560-610 b. 660-710 *
c. 560-610 d. none

57. Tempering temperature range for grade 431 is
a. 550-650 b. 565-605 *
c. 560-705 d. 565-705

58. Which of following is called as austinite conditioning
a. precipitation hardening *
b. solution treatment
c. stress releaving
d. all of the above

59. Temperature range for solution treatment varries from _________ ^{0} C.
a. 930-1030 b. 930-1040 *
c. 1030-1130 d. 1030-1140

60. Temperature range for precipitation hardening vary between __________ ^{0} C.
a. 550-650 b. 550-620 *
c. 650-750 d. 650-720

61. Pickling in HNO_3-HF solution to remove oxides is done in
a. solution treatment
b. precipitation hardening *
c. stress relieving
d. all of the above

62. Creep resistance is increased by __________
a. solution treatment b. precipitation hardening
c. stress relieving * d. all of the above

63. Quenching or rapid cooling
a. reintroduce residual stresses *
b. removes residual stresses
c. either a. & b.
d. none of the above

64. In which of following decarburisation is favoured without any loss of chromium
a. argon oxygen decarborisation (AOD) *
b. vaccum induction melting (VIM)
c. vaccum arc remelting (VAR)
d. electron beam melting (EBM)

65. Which of following belongs to vaccum degassing (VD)
a. stream degass
b. vaccum ingot teeming
c. ladle-to-ladle stream degassing
d. all of the above *

66. Several melts that are necessary for heavy ingots are accumulated
a. vaccum heating degassing *
b. ladle-to-ladle stream degassing
c. vaccum degrassing
d. all of the above

67. Ladle with argon stirring is
a. advantage of ladle-to-ladle stream degassing *
b. disadvantage of ladle-to ladle stream degassing
c. not belong to ladle-to-ladle stream degassing
d. none of the above

68. Vaccum oxygen decarburisation is a mordified
    a. tap degsassing
    b. vaccum ingot teeming
    c. ladle degassing *
    d. static vaccum

69. Production of low desaging interstitial ferrit steels are done in
    a. electron beam melting *
    b. vaccum desaging
    c. argon oxygen decarbusisation
    d. all of the above

70. Which of following stands for forging
    a. open die b. closed die
    c. upset d. all of the above *

71. Forging temperature range for SAF 2205 is __________ ^{0}C.
    a. 900-1100 b. 900-1150 *
    c. 900-1200 d. all of the above

72. Which of the following is used for aeroengine components
    a. Z12 CN13 b. Z20 CDNb11
    c. both a. & b. * d. 14 KH17N2

73. Blades & other components and structural components are manufactured from
    a. Z12 CNDV12 * b. Z12 CN13
    c. 20 KH13 d. Z 30C13

74. Washers for aircraft are manufactured from
    a. AE 962 W b. MDN 431A
    c. both above * d. none

75. Bracket gear box are manufactured from
    a. Z12 CND V12 b. MDN 431 *
    c. Z12 CN 13 d. 20 KH13

76. 2nd and 6th stage rotor blades are manufactured from
    a. Z12 CND V12 b. AE 961W *
    c. AE 962W d. Z20 CD Nb11

77. Actuator rings are manufactured from
    a. MDN 431A b. Z12 CND V12 *
    c. AE 962W d. Z20 CDN b11

78. Compressor shaft is made up of __________
    a. AE 961 b. 14 KH17N2 *
    c. Z12 CN13 d. ALL

79. Hexagonal slotted nuts are manufactured of
    a. AE 96 *1 b. 14 KH17NL
    c. Z12 CN13 d. AE 962W

80. 2nd & 8th stage stator blades are manufactured from __________ .
    a. AE 961W * b. Z12 CNDV12
    c. AE 962W d. Z12 CN13

81. Planks and fuel tanks working up to 600^0 C are manufactured of from
    a. AE 961W b. AE 962W *
    c. Z12 LND12 d. all of the above

82. Turn buckle retainer is manufactured from
    a. AE 961W b. AE 962W
    c. MDN 431A * d. Z12 CNDV12

83. Bell crank shaft are manufactured from __________
    a. AE 961W b. AE 962W
    c. MDN 431A * d. Z12 CNDV12

84. Which of following is $1/8$ hard
    a. MIL-T-6845 * b. MIL-T-6854
    c. AMS 5556 d. AMS 5560

85. Which of following is annealed
    a. MIL-T-6854 b. MIL-T-6845
    c. MIL-T-8808 d. both b. & c. *

86. Which of following is not annealed but is $1/8$ hard
    a. AMS 5557 b. AMS 5560
    c. AMS 5556 d. MMS 5566 *

87. Which of following is annealed
    a. MIL-T-6845 b. AMS-5566
    c. both a. & b. d. none of the above *

88. AMS 5556 is
    a. annealed * b. $1/8$ hard
    c. both d. none

89. Which of the following do not govern the choice of perticular process
    a. type of steel
    b. tonnage of requirement
    c. application
    d. none *

90. In view of the closed dimensional tolerances
    a. rolled bars are preffered *
    b. forged bars are preffered
    c. both a. & b.
    d. none of the above

91. Length of indigenously available forged bars are limited to
    a. 3-4 * b. 4-5
    c. 6-7 d. 5-6

92. Rotary piercing and punch piercing are employed in
    a. 1st stage * b. 2nd stage
    c. 3rd stage d. 4th stage

93. Surface irregularities are removed in
    a. sizing mills * b. sinking mills
    c. stretch reducing mills d. all of the above

94. Tube dimensions are reduced upto 50% in
a. sizing mills b. sinking mills *
c. stretch reducing mills d. all of the above

95. 75% reduction in diameter is achieved in
a. sizing mills
b. sinking mills
c. stretch reducing mills *
d. all of the above

96. 40% reduction in wall thickness is obtained in
a. sizing mills
b. sinking mills
c. stretch reducing mills *
d. all of the above

97. In three roll piercer the three rolls are kept at
a. 60^0 apart b. 120^0 apart *
c. 90^0 apart d. 180^0 apart

98. Which of following used for tubes 50 to 400 mm OD
a. plug mill * b. pilger mill
c. assel mill d. push bench

99. Suitable for thick walled ball bearing steal tubes within the site range 50-240 mm OD is
a. plug mill b. pilger mill
c. assel mill * d. push bunch

100. Suitable for carbon and alloy steel tubes in range of 50 to 175 mm OD
a. plug mill b. pilger mill
c. push mill * d. assel mill

101. Carbon & high alloy steel bars of size 25 to 175 mm OD is obtained in
a. pilger mill b. push mill
c. assel mill d. contineous mill *

102. AP 517W is a mordified of
a. 420 martensitic stainless steel *
b. 421 martensitic stainless steel
c. 419 martensitic stainless steel
d. all of the above

103. AP-517W is a mordified of
a. 420 martensitic stainless steel
b. AE 961
c. both a. & b. *
d. 419 martensitic stainless steel

104. Which of the following elements are ingredients for AP-517 W
a. Ni b. Mo
c. W d. all of the above *

105. What is the minimum percentage of carbon in AP-517W
a. 0.11 b. 0.12 *
c. 0.13 d. 0.14

106. What is the maximum percentage of carbon in AP-517W
a. 0.11 b. 0.18
c. 0.2 d. 0.19 *

107. What is the maximum percentage of silicon in AP-517W
a. 0.1 b. 0.3
c. 0.5 * d. 0.6

108. What is the range of percentage of element 'W' in AP-517W
a. 0.6<but<1.05 * b. 0.6<but<1
c. 1<but<1.05 d. 0.6<but<2

109. What is the maximum percentage of Cr in AP 517W
a. 10.12 b. 10.5
c. 12.55 * d. 12.56

110. What is the minimum percentage of Cr present in AP-517W
a. 10.12 b. 10.32
c. 10.95 * d. 10.42

111. What is the maximum percentage of phosphorous present in AP-517W
a. 0.02 b. 0.03 *
c. 0.04 d. 0.05

112. What is the minimum percentage of nickel present in AP-517W
a. 1.4 b. 1.5
c. 1.6 * d. 1.7

113. What is the maximum percentage of nickel present in AP-517W
a. 2.1 b. 2.2 *
c. 2.3 d. 2.4

114. What is the minimum percentage of Mo present in AP-517W
a. 1.22 b. 1.11
c. 1.33 * d. 1.44

115. What is the maximum range of N_2 present in AP-517W
a. 0.02 b. 0.04
c. 0.06 d. 0.08 *

116. What is the minimum percentage of N_2 in AP-517W
a. 0.02 * b. 0.04
c. 0.06 d. 0.08

117. What is the minimum percentage of V present in AP-517W
a. 0.14 b. 0.15
c. 0.16 * d. 0.17

118. What is the maximum percentage of V in AP-517W
a. 0.33 b. 0.32 *
c. 0.34 d. 0.31

119. The minimum percentage of Nb is ___________ in AP-517W.
a. 0.1 b. 0.01
c. 0.2 * d. 0.02

120. The maximum percentage of Nb is __________ in AP-517W
a. 0.33 b. 0.34
c. 0.35 * d. 0.36

121. The range of Nb in AP-517W is
a. >0.2, <0.35 * b. >0.35, <0.45
c. >0.2, >0.35 d. >0.1, <0.36

122. For AP-517W the primary melting is through ___________ and the secondary melting is through ___________.
a. electric arc furnace for both *
b. electric arc furnace & electro slag refining
c. electro slag refining both
d. electro slag ritching and electro arc furnace

123. Forged solution treated and primary hardened are the supply conditions of
a. MDN 59A bars * b. MDN 60A bars
c. MDN 59A plates d. MDN 60A plates

124. Hot rolled solution treated and primary hardened are the supply conditions for
a. MDN 59A bars b. MDN 60A bars
c. MDN 59A plates * d. MDN 60A plates

125. Supply condition for MDN 60A sheets is
a. forged solution treated and primary hardened
b. hot rolled solution treated and primary hardened
c. cold rolled sheets in solution treated *
d. none of the above

126. For MDN 59A primary melting is by __________
a. electric arc furnace *
b. vaccum arc remelting
c. electro slag refining
d. none of the above

127. For MDN 60A the primary arc is through___________.
a. electric arc furnace * b. electro slag refining
c. vaccum arc refining d. electro arc refining

128. The density for alloy MDN 59A is __________.
a. 7.77 b. 7.75 *
c. 7.78 d. 7.76

129. The density for alloy MDN 60A is __________.
a. 8.33 b. 8.55
c. 8.38 * d. 8.37

130. Coefficient of thermal expansion ($10^{-6}k^{-1}$) at RT-1000 is __________.
a. 10.88 b. 9.88
c. 11.88 * d. 12.88

131. Which of following is not a specification for MDN 60A
a. BS 5S 100 b. BS 2S 500
c. BS 3S 500 d. all of the above *

132. BS-4S-100 is a specification for alloy __________
a. MDN 59A bars * b. MDN 59A plates
c. MDN 60A sheets d. MDN 60A bars

133. BS 2S 500 is specification for alloy __________.
a. MDN 59A bars b. MDN 59A HR plates
c. MDN 60A sheets d. both a. & b. *

134. For single bend test of alloy MDN 59A & MDN 60A is
a. 90^0 b. 180^0 *
c. 45^0 d. 60^0

135. Boiling time for alloy MDN 59A & MDN 60A in special bend test is
a. 60 hrs b. 30 hrs
c. 72 hrs * d. 82 hrs

136. Boiling solution in special boiling solution is __________ for MDD 59A/60A.
a. $CuSO_4$ only b. H_2SO_4 only
c. both above * d. none

137. Average erichsen No [1] for alloy MDN 60A is ___________ .
a. 8.2 b. 9.2 *
c. 10.2 d. 6.2

138. ASTM No for MDN 59A bars is
a. 5-6 b. 4-6 *
c. 3-6 d. 2-6

139. ASTM No for MDN 59A HR plates is __________
a. 1-6 b. 2-6
c. 3-6 d. 5-6 *

140. ASTM No for MDN 60A sheets is
a. 4-7 b. 5-7
c. 6-7 * d. 3-7

141. Which of following is used for jaguar application is
a. MDN 59A b. MDN 60A *
c. both a. & b. d. none of the above

142. MDN 59A is used for manufacturing
a. armour bottom b. valves
c. fittings d. all of the above *

143. In impact test MDN 59A alloy TS limit is __________. (longitudinal bars)
a. 27 lim [2] * b. 8 min
c. 20 min d. none

144. The shear strength for alloy MDN 59A bars is
a. 924-940 b. 923-948 *
c. 929-1000 d. none

145. The shear strength for alloy MDN 59A HR plates is
   a. 850-860   b. 860-890 *
   c. 860-900   d. 840-880

146. Ultimate torsion shear strength for 1000 min duration of MDN 59A is
   a. 1100-1125   b. 1125-1150
   c. 1125-1154 *   d. 1130-1164

147. Ultimate torsion shear strength for 1000 min. duration of MDN 59A HR plate is
   a. 1100-1125b.   1100-1134 *
   c. 1100-1135   d. 1100-1136

148. In impact strength test of MDN 59A longitudinal bars at -70^0 C is
   a. 8.8-27.1 *   b. 8.7-27
   c. 8.8-26.1   d. 8.8-26

149. In impact strength of transverse bar at -70^0 C is __________ for MDN 59A.
   a. 10.8-13.8 *   b. 10.6-13.6
   c. 10.8-13.6   d. 10.6-13.8

150. In impact strengths of longitudinal HR plates at -70^0 C is ___________ for MDN 59A
   a. 8.1-13.1   b. 8.1-13.5 *
   c. 8.5-13.5   d. 8.5-13.1

151. In impact strength of transverse HR plate at -70^0 C is __________ of MDN 59A
   a. 8.0-9.0   b. 8.0-9.1
   c. 8.0-9.3 *   d. 8.0-9.2

■■■

CHAPTER - 14
CAST STAINLESS STEELS

1. MDN 268 LA is ____________
   a. austenitic cast steel *
   b. sub austenitic cast steel
   c. martenisitic cast steel
   d. sub martensitic cast steel

2. MDN 25-20 LA contain __________ % carbon.
   a. 0.10 b. 0.11
   c. 0.12 * d. 0.15

3. Which of the following belongs to MDN 268 LA
   a. good weildability
   b. hot corossion resistance
   c. high ultimate tensile strength
   d. all of the above *

4. MDN 25-20 LA is used because of high
   a. carbon content b. high nickel content *
   c. high cromium content d. high cadmium content

5. Nickel content in MDN 25-20 LA is
   a. 10% b. 20% *
   c. 15% d. 25%

6. Chromium percentage in MDN 268 LA is
   a. 15% b. 16% *
   c. 17% d. 19%

7. Ni percentage in MDN 268 LA is
   a. 15% b. 10%
   c. 5% d. 3% *

8. Melting range of MDN 268 LA __________ ^{0} C is
   a. 1425-1525 b. 1525-1610 *
   c. 1425-1510 d. none of the above

9. Melting range of MDN 25-02 LA is __________ ^{0} C .
   a. 1200 b. 1230 *
   c. 1240 d. 1225

10. At 800^0 C weight gain of MDN 25-20 LA is __________ gm/m^2.hr.
    a. 0.14 * b. 0.25
    c. 0.42 d. 0.77

11. At 1000^0 C weight gain of MDN 25-20 LA is __________ gm/m^2.hr
    a. 0.14 b. 0.25
    c. 0.42 * d. 0.77

12. At 900^0 C weight gain of MDN 25-20 LA is __________ gm/m^2.hr
    a. 0.14 b. 0.25
    c. 0.42 d. 0.77 *

13. At 1100^0 C weight gain for MDN 25-20 LA is __________ gm/m^2.hr
    a. 0.4 b. 0.25
    c. 0.42 * d. 0.77

14. Life in 10^6 cycles [6] of MDN 268 LA is
    a. 10 * b. 15
    c. 20 d. 25

15. Stress rupture strength for MDN 268 LA at 400^0 C in hr is ____________.
    a. 100 * b. 200
    c. 300 d. 400

16. Stress rupture strength in hr at 400^0 C for MDN 268 LA is __________.
    a. 50 b. 75
    c. 100 * d. none

17. High cycle fatigue strength of MDN 268 LA is ___________ in 10^6 cycle.
    a. 10 * b. 20
    c. 25 d. 30

18. Which of following is not an application of MDN 268 LA
    a. 1-stage stator
    b. branch pipes, blades
    c. bearing housings
    d. turbine and turbo-compressor *

19. Wingnuts are manufactured from ___________.
    a. MDN 268 LA * b. MDN 25-20 LA
    c. both d. none

20. Which of the following is not manufactured from MDN 268 LA
    a. cast blades b. valve mountings
    c. both * d. none

21. Which of the following are not manufactured from MDN 25-20 LA
    a. I-stage * b. value of nozzles
    c. brackets d. nozzle diaphram

22. Which of the following are manufactured out of MDN 268 LA
    a. bearing housing b. filter framers
    c. dogs d. all of above *

23. Which of following not manufactured by MDN 268 LA
    a. I-stage b. branch pipes
    c. wing nuts d. none *

24. Which of following are manufactured of MDN 25-20 LA
    a. I-stage state blades
    b. bearing house
    c. both a. & b.
    d. none *

25. Valve mounting , turbine and turbo (gas) compressors are manufactured out of
    a. MDN 268 LA   b. MDN 25-20 LA *
    c. both a. & b.   d. none

26. Which of following are not covered under AISI designations
    a. 304   b. 304 L
    c. 321   d. none *

27. Which are not under requirement for aircraft hydroulic fluid tubes
    a. high strength with brittleness *
    b. high strength with ductility
    c. super fatigue resistance
    d. excellent corrossion resistance

28. Cold worked stands for
    a. annealed   b. $\frac{1}{3}$ rd hard
    c. $\frac{1}{8}$ hard *   d. all of the above

29. Suitable for carbon & alloy steel tube in the range of 50 to 175 mm OD is processed by ___________.
    a. assel mill   b. push bench *
    c. contineous mills   d. extrusion

30. Introduction of an elongater is used in
    a. assel mill   b. push bench *
    c. contineous mill   d. extrusion

31. The process preferable for thin wall tubing is
    a. assel mill *   b. pilger mill
    c. contineous mill   d. push bench

32. Carbon and high alloy steel bars at size 25-127 mm OD are processed by
    a. push bench   b. contineous mills *
    c. extrusion   d. pilger mills

33. Small lots are preferebly produced by
    a. contineous mills   b. push bench
    c. extrusion *   d. pilger mills

34. Long tubes up to 22 mtr. are processed by
    a. assel mills   b. pilger mills
    c. contineous mills *   d. extrusion

35. A hollow billet is pushed through a die in___________.
    a. extrusion *   b. assel tube
    c. contineous mills   d. pilger mills

36. Tubes in size range of 30-35 mm OD are manufactured by
    a. extrusion *   b. assel tubes
    c. contineous mills   d. pilger mills

37. The billet is required to be heated to the correct temperature during
    a. piercing only   b. extrusion only
    c. both a. & b. *   d. none

38. Sinking mills reduces the tube diameter upto
    a. 44%   b. 55% *
    c. 33%   d. 66%

39. Stretch reducing mills exploys multi-stands of three rolls effecting upto __________% reduction in dia and ____________% reduction in wall thickness
    a. 75%, 40% *   b. 75%, 75%
    c. 40%, 75%   d. 40%, 40%

40. Which of the following is the advantage of cold pilgering over cold drawing
    a. higher percentage reduction in one pass
    b. better yield
    c. larger dia
    d. all of the above *

41. Production of small lot is not economical for
    a. cold working *   b. hot reducing
    c. both a. & b.   d. none

42. Cost of dies and mandrels in cold working
    a. more than that of hot reducing *
    b. less than that of hot reducing
    c. equal to that of hot reducing
    d. all of the above

43. Controls are generally exercised on
    a. input material
    b. bars that are to be converted to tubes
    c. final product in stainless steel manufacturing
    d. all of the above *

44. Which of following only responsible for surface finish quality
    a. smothness of machined billet *
    b. punch of mandrel
    c. choice of lubricants
    d. all of the above

45. Which of the following does not undergo quality control checks for forged bar.
    a. surface conditioning
    b. perpendicularity of cut surfaces to the billet axis *
    c. dimensions and straightness
    d. internal soundness

46. Perpendicularity of cut surface to the billet axis belong to process
    a. farged bar   b. deep hole drilling
    c. cutting *   d. piercing

47. Control of concentration, temperature and time of pickling control checks belong to ___________ process.
   a. straightning
   b. cold pilgering
   c. deglassing & pickling *
   d. degreasing

48. Which of the following process do undertake surface finish quality control
   a. straightening b. degreasing
   c. pickling d. all of above *

49. Concentration, temperature and time in the both followed by surface finish are the control checks for
   a. straightening b. degreasing
   c. pickling * d. annealing

50. Straightness followed by absence of surface defects are the control check for stage
   a. annealing b. straightening *
   c. final cutting d. all of the above

51. Length measurement is a control check for
   a. packing b. final cutting *
   c. pickling d. straightening

52. Which of following not a quality control for straightening process
   a. roller marks and surface finish
   b. straightness
   c. absence of surface defects
   d. absence of burrs *

53. Which of following is not a quality control for pickling process
   a. control of concentration, temperature and time of pickling
   b. concentration, temperature and time in the both
   c. absence of burrs *
   d. surface finish

54. Ordered weight, length etc. quality control undergo
   a. packing * b. pickling
   c. annealing d. all of above

55. Glass lubication, speed are the quality control for
   a. extrusion * b. straightening
   c. pickling d. packing

56. Visual inspection of surfaces is the quality control for
   a. cold pilgering b. degreasing
   c. both a. & b.* d. final cutting

57. Hydroulic pressure testing is a quality control check that belong to ___________ process.
   a. cold piercing
   b. product inspection & testing *
   c. both a. & b.
   d. final cutting

58. Black-visual & dimensional inspection are done
   a. before deglassing
   b. after deglassing
   c. after deglassing & pickling *
   d. before pickling

59. OD, wall thickness and wall variation is a quality control belongs to
   a. degreasing b. pickling
   c. packing d. cold pilgering *

60. Excessive scale formation while in the furnace belongs to
   a. annealing * b. straightening
   c. pickling d. picking

61. Visual inspection of inner and outer surface belongs to
   a. annealing
   b. picking
   c. production inspection *
   d. pickling

62. The temperature range for tensile properties under mechanical test is
   a. -70^0 C to 70^0 C b. -70^0 C to 200^0 C
   c. -70^0 C to 150^0 C d. -70^0 C to 250^0 C *

63. Flarability test belongs to
   a. mechanical test *
   b. passivation test
   c. surface condition test
   d. ultrasonic test

64. Leakage test is a
   a. surface condition test
   b. ultrasonic test
   c. mechanical test *
   d. passivation test

65. Embrittlement test belong to
   a. surface condition test
   b. ultrasonic test
   c. mechanical test *
   d. passivation test

66. Flattening test belongs to
   a. surface conditioning test
   b. mechanical test
   c. passivation test *
   d. ultrasonic test

67. Stainless steel aircraft line tubes are produced in
   a. annealed only b. cold worked only
   c. either a. or b. * d. none

68. In which case the weight save is obtained
   a. annealed b. cold work
   c. $\frac{1}{8}$ hard temper d. both b. & c. *

69. Which of following is under soviet designation steel
a. KH18N10T * b. grade 304
c. TP 321A d. all of above

70. Which of following is under american steel designation
a. KH 18N10T b. TP 321A *
c. 30 KHGSNA d. all of above

71. Which of following is not undergo american steel designation
a. KH 18N10T * b. grade 304
c. TP 321A d. all of above

72. For grade 304 the supply condition is
a. cold drawn * b. hot drawn
c. annealed d. hardened & tempered

73. For TP 321A tube the supply condition is
a. cold drawn b. hot drawn
c. annealed * d. hardened & tempered

74. For 30KH GSNA the supply condition is
a. cold drawn
b. hot drawn
c. annealed
d. hardened & tempered *

75. For KH 18N10T the supply condition is
a. cold drawn * b. hot drawn
c. annealed d. hardened & tempered

76. Cold drawn is a supply condition for
a. grade 304 b. KH 18N10T
c. TP 321A d. both a. & b. *

77. AIM air induction melting is primary melting for grade ___________ .
a. 304 b. TP 321A
c. KH 18N10T d. all of above *

78. VAR vaccum arc melting is a secondary melting for grade
a. 304 b. TP 321A
c. KH 18N10T d. all of above *

79. AMS 2243 is specification for ___________ grade tubes.
a. 304 * b. TP 321A
c. KH 18N10T c. 30 KHSNA

80 TS/IND/MAT/SL/017 tube is specification for grade __________.
a. 304 b. TP 321A
c. KH 18N10T * d. 30 KHGSNA

81. TS/IND/MTL/015 is specification for grade __________.
a. 304 b. TP 321A
c. KH 18N10T d. 30 KHGSNA *

82. TS/IND/MAT/CRE/N/83/1 is specification of _________ grade pipes.
a. 304
b. TP 321A
c. KH 18N10T
d. 30 KHGSNA *

83. Melting range for grade 304 alloy is
a. $1400\text{-}1450^0$ C * b. $1400\text{-}1550^0$ C
c. $1450\text{-}1550^0$ C d. $1400\text{-}1500^0$ C

84. TP 321A alloy have melting range
a. $1400\text{-}1425^0$ C * b. $1400\text{-}1450^0$ C
c. $1400\text{-}1475^0$ C d. $1400\text{-}1500^0$ C

85. Density of alloys of grade 304, TP321A and KH 18N10T is ___________ gm/cm^3.
a. 6.0 b. 7.0
c. 8.0 * d. 9.0

86. Elastic property of grade 304, TP 321A and KH 18N10T in GPa is
a. 190 b. 191
c. 193 * d. 195

87. Electrical resistivity $\mu\Omega$ .cm of alloy 304, TP321A & KH 18N10T
a. 70 b. 72 *
c. 74 d. 76

88. At room temperature BHN for alloy 30 KHGSNA is
a. 470 b. 477 *
c. 570 d. 577

89. For low temperature mechanical test temperature mentained is
a. -60^0 C b. -70^0 C *
c. -50^0 C d. -40^0 C

90. For inner crystaline corrosion test the boiling time for grade 304, TP 321A is
a. 12 hr b. 6 hr
c. 24 hr * d. 48 hr

91. Angle of bend for inter crystalline corrosion test is
a. 45^0 C b. 90^0 C *
c. 180^0 C d. 60^0 C

92. In flaring test for alloy grade 304, and KH 18N10T the outer diameter expansion is
a. 5% b. 10% *
c. 15% d. 20%

93. Reduce of bend in bend test grade 304
a. 3 times the outer dia.
b. 3.5 times the outer dia. *
c. 4 times the outer dia.
d. none

94. Which of the following material is not used for manufacturing of tubes for hydraulic fluid system in aircraft
   a. grade 304   b. TP 321A
   c. 30 KH GSNA *   d. KH 18N10T

95. Which of the following is not used for fabrication of under carriage parts
   a. grade 304   b. TP 321A
   c. KH 18N10T   d. all of above *

96. Concentricity of bore with billet OD is a quality control belongs to the process
   a. deep hole drilling   b. piercing
   c. both a. & b. *   d. extrusion

97. Control of concentration, temperature and time of pickling is a quality control belongs to process
   a. deglassing   b. pickling
   c. packing   d. both a. & b. *

98. Tests for mechanical property and metallurgical characteristics followed by dimensional measurement is quality control for process
   a. heating & reheating
   b. deglassing & pickling
   c. production, inspection & testing *
   d. all of the above

99. 1200T hydraulic vertical piercing/expansion press is belongs to
   a. forging   b. extrusion
   c. cold pilgering   d. hot piercing *

100. In metallographic examination for microstructure etchant used is
   a. 10% acitic acid   b. 10% oxyacetic acid
   c. 10% carbonic acid   d. 10% oxalic acid *

101. ASTM No. for grade 304 in metallographic examination is
   a. 5-6 [6]   b. 5-6 [8]
   c. 5 or higher [1]   d. both b. & c. *

■■■

CHAPTER - 15
MARAGING STEELS

1. Maraging steels are characterised by
   a. high carbon content
   b. low carbon content *
   c. no carbon content
   d. none of the above

2. Maraging steels are considered as
   a. low carbon martensites *
   b. high carbon martensites
   c. low carbon austensites
   d. high carbon austensites

3. Ms temperature decreases with
   a. increase in nickel content *
   b. decrease in nickel content
   c. independent of nickel content
   d. none of the above

4. Maximum percentage of Ni in maraging steel is
   a. 15 b. 20
   c. 25 * d. 30

5. In the case of maraging grade compositions the martensite contain Ni upto __________%.
   a. 22 b. 23 *
   c. 24 d. 25

6. Maganese should be kept at much lower level to retain adequate ___________ .
   a. hardness b. toughness *
   c. softness d. brittleness

7. Manganese in maraging steel have ___________ property.
   a. embrittling b. surface smothing *
   c. surface hardning d. none

8. The extent of strengthning in maraging steel during ageing depends upon
   a. hardness factor
   b. softering factor
   c. relation between a. and b. *
   d. none

9. An ordering reaction in the cobalt containing solid solution causes
   a. hardening * b. softening
   c. both a. & b. d. none

10. The fine, uniform precipitation of various intermetallic compounds causes
    a. hardening * b. softening
    c. both a. & b. d. none

11. Which of the following are precipitates identified in maraging steels
    a. Ni_3Mo b. Fe_2Mo
    c. Ni_3Ti d. all of the above *

12. The size of precipitate particles lies in the range of
    a. $(100\text{-}200)A^0$ b. $(100\text{-}300)A^0$
    c. $(100\text{-}400)A^0$ d. $(100\text{-}500)A^0$ *

13. Average spacing of the precipitate particles are
    a. $(300\text{-}400)A^0$ b. $(300\text{-}500)A^0$ *
    c. $(300\text{-}600)A^0$ d. none

14. The shape of precipitate particles are
    a. spherical only b. disk like only
    c. ribbon-like only d. all of above *

15. No ordering reaction in the cobalt containing solid solution take place in
    a. BCC : Fe-Co alloys b. FCC : Fe-Ni alloys
    c. FCC : Co-Ni alloys * d. all of above

16. Ni-19.3% Co alloys resulted in
    a. B-2 type long range ordering *
    b. B-2 type short range ordering
    c. A-2 type long range ordering
    d. A-2 type short range ordering

17. Short range solid solution atomic arrangement & control
    a. precipitation of Mo-Ni only
    b. precipitation of Ti-Ni only
    c. both a. & b. *
    d. none of the above

18. With high nickel and cobalt contents
    a. high strength achieved
    b. very high strength achieved *
    c. low strength achieved
    d. very low strength achieved

19. With increasing cobalt content the strength
    a. linearly increases *
    b. linearly decreases
    c. non-linearly decreases
    d. non-linearly increases

20. With increasing cobalt content SFE of the matrix in the austeritic state
    a. increases b. decreases *
    c. unaltered d. all of above

21. In maraging steel enrichment in austenite dependent upon
    a. temperature only b. composition only
    c. both a. & b. * d. none

22. formation of Ni_3Ti results in
    a. increase in nickel content
    b. decrease in nickel content *
    c. constant nickel content
    d. none

23. If added together both cobalt and molybdenum
    a. effect of cobalt is predominant
    b. effect of molybdenum is predominant *
    c. both have same effect
    d. none of the above

24. Presence of austenite in structure
    a. reduces the strength *
    b. increases the strength
    c. increases uniform elongation
    d. decreases uniform elongation

25. Presence of austenite in structure
    a. reduces the strength
    b. increases the strength
    c. increases uniform elongation *
    d. decreases uniform elongation

26. Large amount of austenite in structure
    a. increases the corrosion resistance *
    b. decreases the corrosion resistance
    c. do not alter corrosion resistance
    d. all of above

27. Large amount of austenite
    a. affect magnetic property *
    b. do not affect magnetic property
    c. either a or b
    d. none

28. Nickel provide tough ductile
    a. martensitic matrix * b. austensitic matrix
    c. combination of a. & b. d. none

29. Nickel addition acting as
    a. softner b. hardner
    c. strengthner * d. none

30. Which of the following have synergistic effect
    a. nickel b. molybdenum
    c. cobalt d. both b & c *

31. Combined contribution of hardening of two elements is greater than individuals contribution. Such effect is called as
    a. energystic effect
    b. synergystic effect *
    c. combinational hardening effect
    d. all of above

32. The addition of Co
    a. raises the martensitic transformation range *
    b. decreases the martensitic transformation range
    c. do not alter martensitic transformation range
    d. none of the above

33. The Co facilitates
    a. higher content of Mo only
    b. higher content of Ti only
    c. both a. & b. *
    d. none of the above

34. Titanium is
    a. potential strengther * b. potential softner
    c. a week strengther d. week softner

35. Aluminium added primarily as
    a. oxidizer * b. deoxidizer
    c. either a or b d. none

36. Aluminium increases
    a. impact strength only b. strength only
    c. both a. & b. * d. none

37. Which of the following when added increases stress corrosion
    a. aluminium b. titanium
    c. boron * d. all of above

38. Which of the following when added impaire impact strength
    a. silicon only b. manganese
    c. both a. & b. * d. zirconium

39. Which of the following is not an interstitials
    a. carbon b. nitrogen
    c. oxygen d. titanium *

40. Addition of nitrogen in titanium
    a. forms TiN inclusions
    b. TiCN inclusions
    c. reduces transverse property
    d. all of above *

41. Hydrogen
    a. impairs resistance to stress corrosion cracking
    b. promotes hydrogen embrittlement
    c. both a. & b. *
    d. none

42. 18 Ni maraging steel are classed as
    a. 200 b. 250
    c. 300 d. all *

43. Conventional heat treatment cycle applicable to type 18%Ni steel comprises
    a. homogeneous annealing
    b. solution annealing
    c. aging
    d. all of above *

44. The establishment of a maraging treatment to achieve the usual precipitate distrubution is obtained by
a. inversion treatment *
b. heat treatment
c. combination of a. & b.
d. none of above

45. Subsequent transformation to martensite to achieve an extremly high dislocation density associated with slight decrease in yield strength is obtained from
a. inversion treatment * b. heat treatment
b. combination of a. & b. d. none

46. Homogeneous treatment eliminates
a. retained austinite * b. retained martensite
c. both a. & b. d. none

47. Property of maraging steels is
a. ultra high yield
b. high tensile strength
c. fracture toughness
d. all of above *

48. Maraging steels are soft because of
a. low carbon martenite *
b. low carbon austenite
c. high carbon martensite
d. high carbon austenite

49. Following the aging
a. huge dimension change occurs
b. small dimension change occurs *
c. dimension is unaltered
d. none of the above

50. For maraging steel material, they exhibit good weildability as
a. pre-heating required
b. pre-heating is not required *
c. post heating required
d. post heating not required

51. Quenching not required in maraging steel because
a. solution treatment followed by air cooling
b. subsequent aging followed by air cooling
c. simple heat treatment cycle required
d. all of the above *

52. By air cooling from austenitizing range
a. ductile Fe-Ni martensite is produced *
b. brittle Fe-Ni martensite is produced
c. ductile Fe-Ni austenite is produced
d. brittle Fe-Ni austenite is produced

53. For welding of maraging steel material heat affected zone restored by
a. pre-weld aging treatment
b. weld aging treatment
c. post weld aging treatment *
d. none of the above

54. In comparison to other steel of same strength level the maraging steel have better
a. corrosion resistance
b. stress corrosion resistance
c. hydrogen embrittlement
d. all of above *

55. The wrought 18% Ni can be prepaired by
a. air induction melting only
b. vaccum induction melting only
c. both a. & b. *
d. none of the above

56. For higher titanium grade
a. air induction melting prefered
b. vaccum induction melting prefered *
c. both a. & b.
d. none of the above

57. Remelting in a consumable electrode furnace
a. decreases segregation
b. improves cleanliness
c. imparting superior property
d. all of above *

58. For good surface finish
a. air induction furnace prefered
b. vaccum induction furnace prefered *
c. both a. & b.
d. none of the above

59. In order to possess sufficient castability
a. vaccum induction furnace prefered
b. air induction furnace prefered *
c. both a. & b.
d. none of the above

60. For sufficient fluidity
a. vaccum induction furnace prefered
b. air induction furnace prefered *
c. both a. & b.
d. none of the above

61. Segregation-free products can be obtained from
a. pre alloyed powders
b. hot extrusion of canned billets
c. both a. & b. *
d. post alloyed poweders

62. By which of the following process, wrought maraging steels easily hot worked
a. rolling b. forging
c. drawing & extrusion d. all of above *

63. Prior to forging homogenization of ignots of maraging steel is recommended at ___________ ^{0} C.
a. 1060 b. 1160
c. 1260 * d. 1360

64. Hot working of maraging steels are carried out between temperature
a. $1260\text{-}815^{0}$ C * b. $1160\text{-}815^{0}$ C
c. $1360\text{-}815^{0}$C d. $1060\text{-}815^{0}$ C

65. For obtaining uniform small grains & optimum mechanical property
a. finishing at low temperature desirable *
b. finishing at high temperature desirable
c. both a. & b. according to given condition
d. none of the above

66. Maraging steels are seem to be
a. self-healing b. forge-weld
c. both a. & b. * d. none

67. Which of the following are forge-weld
a. carbon steel b. low alloy steel
c. both a. & b. * d. high alloy steel

68. Which of the following belongs to production tooling application of maraging steel
a. load cells
b. universal flexures
c. splined shafts *
d. gimbal ring pivots

69. Which of the following belongs to hydrospace application of maraging steel
a. load cells
b. universal flexures
c. splined shaft
d. deep quest pressure hull *

70. Rocket Motor cases are the application of maraging steel in
a. production tooling
b. military
c. aerospace
d. both b & c *

71. Which of the following are not the application of maraging steels belongs to production tooling
a. pistons
b. auto frettage equipment
c. springs
d. none of the above *

72. Which of the following is not an application of maraging steel in the field of autoracing cars
a. drive shafts
b. gear box
c. connecting rods
d. cable sockets *

73. Landing gear is application of maraging steel in the field of
a. military b. hydro space
c. aero space * d. auto racing cars

74. Hydraulic hoses is application of maraging steel belongs to
a. military b. hydrospace
c. aerospace * d. none

75. Arresting hook is the application of maraging steel belongs to
a. aerospace * b. military
c. hydrospace d. racing cars

76. Anchor rails for mobile service tower of saturn 1B is the application of maraging steel belongs to
a. aerospace * b. military
c. hydrospace d. racing cars

77. Which of following is not application of maraging steel in the field of aerospace
a. gimbal-ring pivots
b. load cells
c. cannon recoil spring *
d. helicopter flexible drive shafts

78. Which of the following is not an application of maraging steel in production tooling
a. gears in M/C tools
b. splined shafts
c. springs
d. load cells *

79. Which of the following is not an application of maraging steel in aerospace
a. diesel fuel pump pins *
b. jet engine shafts
c. landing gear
d. arresting hooks

80. HAZ stands for
a. heat aquired zone
b. heat affected zone *
c. heat attenuated zone
d. none

81. Considerable refinement of austenite grain occur resulting
a. finer martensitic structure *
b. finer austenitic structure
c. partly a & partly b
d. none of the above

82. Which of following is metastable
a. Fe-Ni martensite matrix *
b. Fe-Ni austenite matrix
c. both a. & b.
d. none of the above

83. Age hardening accomplished by
a. binary Fe-Ni alloy
b. ternary Fe-Ni-Co alloy *
c. Fe alloy only
d. Ni alloy only

84. Stable austenite can be formed at temperature range of ___________ ^{0}C in maraging steel
a. 400-600 b. 400-500
c. 400-700 * d. none

85. SFE stands for
a. safety fault error
b. stacking fault energy *
c. stacking fault error
d. none of the above

86. Additions of Ti, Nb, V and Si in steels
a. increases Ms temperature *
b. decreases Ms temperature
c. both a. & b.
d. none of the above

87. With increasing manganese content in steels
a. bittleness increases *
b. bittleness decreases
c. ductility increases
d. ductility decreasess

88. In lath maragin steel substitution of manganese for nickel is in proportion of
a. 1 to 3 * b. 1 to 4
c. 1 to 2 d. 1 to 5

89. Twinned martensite forms at
a. higher nickel content *
b. lower nickel content
c. both a. & b.
d. none of the above

90. Function of cobalt in maraging steel is
a. to increase martensite range *
b. to decrease martensite range
c. to unalter martensite range
d. none of the above

91. The Ni content in 200 grade steel is
a. 19.3 b. 18.3 *
c. 20.3 d. 17.3

92. The Ni content in 250 grade steel is
a. 19 b. 18
c. 17 * d. 20

93. The content of Ni in 300 grade steel is
a. 19.8 b. 18.8 *
c. 17.8 d. 20.8

94. The content of Ni in 350 grade steel is
a. 19.51 b. 18.51 *
c. 18.41 d. 19.41

95. The carbon content in 200 grade steel is
a. 0.005 b. 0.008 *
c. 0.003 d. 0.006

96. The carbon content in 250 grade is
a. 0.008 b. 0.006
c. 0.005 d. 0.003 *

97. The carbon content in 350 grade is
a. 0.008 * b. 0.006
c. 0.005 d. 0.003

98. Maximum carbon percentage is in
a. grade 200 * b. grade 250
c. grade 300 d. all of the above

99. Maximum Ni content is in
a. 200 grade b. 250 grade
c. 300 grade * d. 350 grade

100. Minimum Ni content is in
a. 200 grade b. 250 grade *
c. 300 grade d. 350 grade

■■■

CHAPTER - 16
CORROSION RESISTING STEELS

1. Corrosion resistance steel are often popularly called
   a. stainless steel * b. carbon steel
   c. iron steel d. medium carbon steel

2. Corrosion resistance steel are normally classified into
   a. chrome-nickel steel
   b. hardenable chromium steel
   c. non-hardenable chromium steel
   d. all of the above *

3. Chrome-nickel steel contains
   a. 0.2% C 7% - 13% Nickel *
   b. 0.4% C 8% - 13% Nickel
   c. 0.6% C 9% - 12% Nickel
   d. 0.8% C 10% - 12% Nickel

4. Hardeneable chromium steel contains
   a. 14% - 16% chromium
   b. 12% - 18% chromium *
   c. 16% - 22% chromium
   d. 20% - 26% chromium

5. Non-hardeneable chromium steels containing
   a. 10% - 15% chromium
   b. 15% - 20% chromium
   c. 15% - 30% chromium *
   d. 30% - 40% chromium

6. The main uses of corrosion resistance steel are
   a. non-structural b. structural
   c. both a. & b. * d. none of the above

7. Ultimate tensile strength of stainless steel is
   a. 80,000 - 300,000 PSI *
   b. 90,000 - 400,000 PSI
   c. 70,000 - 40,000 PSI
   d. 60,000 - 9000 PSI

8. The greater strength is obtained by
   a. cold working b. cold drawing
   c. cold rolling d. all of the above *

9. For welding stainless steel, procedure required is
   a. electric spot welding *
   b. oxyacetylene welding
   c. both type of welding
   d. none

10. The corrosion resistance properties of corrosion resistance steel depends upon
    a. physical state b. temperature
    c. corrosion agent d. all of the above *

11. Clean surface is obtained by
    a. pickling b. polishing
    c. both a. & b. * d. none of the above

12. Intergranular corrosion is a phenomenon of
    a. 18 - 8 steel * b. 12 - 8 steel
    c. 6 - 8 steel d. 8 - 18 steel

13. Intergranular corrosion appears in 18 - 8 steel when
    a. heated for heat treatment *
    b. heated during welding
    c. heated during soldening
    d. all of the above

14. All 18 - 8 corrosion resisting steels are
    a. austenitic * b. non aques
    c. non-austenitic d. all of the above

15. Austinilic stainless steel is a
    a. magnetic b. non-magnetic *
    c. no relation to magnet d. none of the above

16. These carbides are belived to be in 18-8 steel
    a. iron carbide b. iron-chromium carbide
    c. both a. & b. * d. none of the above

17. The precipitated carbides do not cause failure until exposed to a / an
    a. active electrolyte agent
    b. salty air
    c. spray or water in the case of the airplane
    d. all of the above *

18. Maximum carbon content in 18-8 steel is
    a. 0.07% * b. 0.06%
    c. 0.05% d. 0.04%

19. Hardness of 18-8 steels during heat treatment is
    a. increased * b. decreased
    c. no effect d. none

20. It is practical hower to anneal or stabilize 18.8 steels to
    a. eliminate carbide precipitation *
    b. remove strain
    c. cold working
    d. all of the above

21. Carbide temperature range are
    a. 900 - 1200^0 F b. 1000 - 1550^0 F *
    c. 1200 - 1600^0 F d. 1400 - 1600^0 F

22. Annealing of steels is done at temperature of
 a. 1940 - 1960^0 F * b. 1600 - 1800^0 F
 c. 1400 - 1600^0 F d. 1600 - 1900^0 F

23. The normalising treatment consist of heating the steel at
 a. 1600 - 1800^0 F b. 1575 - 1625^0 F *
 c. 1625 - 1875^0 F d. 1875 - 1925^0 F

24. The time period required for quenching is
 a. $\frac{1}{2}$ to 1 hour * b. 2 hour
 c. 4 hour d. 5 hour

25. Stainless steels are hardened by heating to
 a. 1875 - 1900^0 F * b. 1900 - 2000^0 F
 c. 2000 - 2100^0 F d. 2100 - 2200^0 F

26. For salt spray test the box must be constructed of a
 a. non-metallic material
 b. natural material such as glass
 c. slate/stone
 d. all of the above *

27. Salt concentration varies in different materials from
 a. 2% - 4% b. 4% - 8%
 c. 4% - 20% * d. 8% - 16%

28. Salt water consists of
 a. 20% of salt, 80% of distilled water *
 b. 40% of salt, 60% of distilled water
 c. 60% of salt, 40% of distilled water
 d. 50% of salt, 50% of distilled water

29. The specific gravity of salt solution is
 a. 1.43 b. 1.62
 c. 1.151 * d. 1.23

30. The salt is commercially pure but contains
 a. low magnesium b. calcium carbide
 c. both a. or b. * d. none of the above

31. The concentration of salt solution should be checked every
 a. 12 hour b. 24 hour *
 c. 6 hour d. 8 hour

32. The test is concentrated at the temperature of
 a. 40^0 C b. 45^0 C
 c. 35^0 C * d. 30^0 C

33. After completion of the salt spray test the specimens are carefully removed and washed in
 a. running tap water * b. hot water
 c. warm water d. none of the above

34. A rating in salt spray test is
 a. an ideal condition b. no pitting
 c. no scaling d. all of the above *

35. B rating in salt spray test is
 a. a good condition very little pitting *
 b. ideal condition
 c. both a. or b.
 d. none

36. C rating in salt spray test is
 a. a fair condition with excessive pitting scaling *
 b. good condition
 c. both a. or b.
 d. none

37. D rating in salt spray test is
 a. a fair condition
 b. an unsatisfactory condition *
 c. good condition
 d. none of the above

38. The strength of a material is adversely affected by
 a. corrosion * b. non-corrosivness
 c. both a. or b. d. none

39. The bright silvery finish may be obtained by pickling in a
 a. 10% Nitric acid and 3% HCl *
 b. 20% Nitric acid and 4% HCl
 c. 40% Nitric acid and 5% HCl
 d. none of the above

40. Bright silvery finish may be obtained by heating upto
 a. 150^0 F b. 160^0 F *
 c. 170^0 F d. 180^0 F

41. After immersion in the pickling solution the work must always be thoroaghly rinsed in
 a. cold water b. warm water
 c. hot water * d. all of the above

42. The best corrosion resistance may be obtained from
 a. 14 - 8 steel b. 8 - 18 steel
 c. 18 - 8 steel * d. 2024 steel

43. Best corrosion resistance may be obtained from 18 - 8 if the surface is
 a. highly polished *
 b. lightly polished
 c. no polishing is required
 d. none of the above

44. Polishing is performed on surfaces which have been
 a. glass blasted b. sand blasted lightly *
 c. both a. or b. d. none

45. It is important when working with steel
 a. steel brush is used
 b. steel brush is not required
 c. wire brush is required
 d. as in b & wire brush is not reqired *

■■■

CHAPTER - 17
FERROUS METALS

1. Ferrous alloys are extremely versatile because they have
   a. Low range of Mechanical & Physical Properties.
   b. Wide range of Mechanical & Physical Properties*
   c. No Mechanical as well as Physical Properties.
   d. None of the above.

2. Pig Iron is produced in
   a. Smith hearth b. Cupola Furnace
   c. Blast Furnace * d. None of the above.

3. In pig iron carbon percentage varies from
   a. 3 to 4% * b. 8 to 7%
   c. 2.37 to 4.64% d. 2 to 10%

4. In Pig Iron silicon varies from
   a. 0.3 to 0.7% b. 0.5 to 2%
   c. 1 to 3% * d. None of the above.

5. In Pig Iron, Maganese varies from
   a. 0.1 to 1% * b. 0.1 to 0.3%
   c. 0.1 to 0.7% d 0.1 to 8%

6. In Pig Iron, Phosphorus varies from
   a. 0.4 to 1.27% b. 0.3 to 1.2%
   c. 1.7 to 2.8% d 0.3 to 1.7% *

7. In Pig Iron, Sulphur is limited upto
   a. 2.0% b. 1.0% *
   c. 3.0% d. 4.0%

8. Raw Material for all iron & steel products is
   a. Pig Iron * b. Nodular Iron
   c. Cast Iron d. None of the above.

9. In alloy steels carbon varies between
   a. 0 to 0.7% b. 2.23 to 4%
   c. 3 to 3.7% d. 0 to 2.0% *

10. Limestone is a
    a. Flux * b. Fuel
    c. Excitor d. All of the above.

11. Wrought Iron is produced from
    a. Pig Iron * b. Cast Iron
    c. Alloy Steels d. Malleable cast Iron

12. Wrought Iron is produced from Pig Iron in
    a. Cupola Furnace
    b. Blast Furnace
    c. Stokes Furnace
    d. Puddling Furnace *

13. Besemmer Process is a
    a. Steel Making Process *
    b. Annealing Process
    c. Normalising Process
    d. Cast Iron making Process.

14. Steel is produced from Pig Iron by
    a. Electric Process b. Open Hearth Process
    c. Bessemer Process d. All of the above. *

15. Ferro manganese in Pig Iron that contains Magnaese between
    a. 74 to 97% b. 74 to 75%
    c. 74 to 82% * d. None of the above.

16. Ferrosilicon, which is in Pig Iron with
    a. 2% silicon & 55% Maganese
    b. 20 to 32% Silicon
    c. 23 to 50% Silicon
    d. 5 to 17% Silicon *

17. Wrought Iron is a mechanical mixture of very pure Iron and a
    a. Rubber b. Plastic
    c. Silicate Slag * d. All of the above.

18. Wrought Iron is a
    a. Ferrous Material * b. Non Ferrous Material
    c. Ceramic d. Organic Material

19. Wrought Iron is
    a. Castable b. Never Cast *
    c. Plastic d. All of the above.

20. Wrought Iron have
    a. Low Ductility b. Medium Ductility
    c. High Ductility * d. High Castability

21. Wrought Iron can be forged or welded
    a. Can not be welded but forged
    b. Easily *
    c. Can not be forged but welded
    d. Both process not possible with wrought Iron

22. Wrought Iron possesses
    a. No resistance towards corrosion.
    b. Low resistance towards corrosion
    c. High resistance towards corrosion *
    d. None of the above.

23. Melting point of wrought iron is
    a. 1600^{o}C b. 1510^{o}C *
    c. 1579^{o}C d. None of the above.

24. Wrought Iron is produced by
    a. Puddling Process b. Aston's Process
    c. Both (a) & (b) * d. Neither (a) nor (b)

25. Gray Cast Iron is a
    a. Low Cost Material *
    b. High Cost Material
    c. Medium Cost Material
    d. Depends upon the availability

26. Gray Cast Iron have
    a. High Compressive Strength
    b. Low tensile Strength
    c. High Rigidity
    d. All of the above.*

27. Gray Cast Iron have
    a. High Fluidity
    b. Relatively low melting temperature.
    c. Both (a) & (b) *
    d. Neither (a) nor (b)

28. Melting Temperature of Gray Cast Iron lies between
    a. 340 to 450°C b. 927 to 989°C
    c. 1000 to 1050°C d. 1130 to 1250°C *

29. In Machining of Gray Cast Iron we found
    a. Continuous Chips
    b. Discontinuous Chips
    c. Continuous Chips with BUE *
    d. None of the above.

30. Gray Cast Iron
    a. Vibrate with high Oscillation
    b. Vibrate with low Oscillations
    c. Does not vibrate *
    d. None of the above.

31. Gray Cast Irons have
    a. No Antifriction Properties
    b. Bad Antifriction Properties
    c. Good Antifriction Properties *
    d. Low Rigidity

32. BUE means
    a. Before ultimate elasticity
    b. Built under elasticity
    c. Built up edges *
    d. None of the above.

33. Gray Cast Irons have
    a. High Stability after 'Weathering'
    b. High Rigidity
    c. Both (a) & (b) *
    d. Neither (a) nor (b)

34. Gray cast Iron basically is an alloy of
    a. Carbon & tungeston with Aluminium
    b. Carbon & Silicon with Iron *
    c. Carbon & Iron only
    d. None of the above.

35. In Gray Cast Iron the length of flakes may vary
    a. .05 to 0.1 mm * b. 1 mm to 3 mm
    c. 0.05 to 0.06 mm d. 0.05 to 2.0 mm

36. Gray Cast Iron possesses high
    a. Tensile Strength
    b. Fluidity *
    c. Melting point temperature than other ferrous alloys
    d. Cost

37. Gray Cast Iron has
    a. No resistance to wear
    b. High resistance to wear
    c. Good finish once the skin is removed.
    d. Both (b) & (c) *

38. Gray Cast Iron possesses
    a. High Vibration damping capacity *
    b. Low Vibration damping capacity
    c. Zero damping capacity
    d. None of the above.

39. Gray cast Iron has
    a. High ductility b. Low rigidity
    c. Low fluidity d. None of the above *

40. Gray Cast Iron has a solidification range of
    a. 3400-3000°F b. 1400-1000°F
    c. 2400-2000°F * d. 2200-700°F

41. Gray Cast Iron has shrinkage of
    a. 1/8 inch /Foot b. 1mm/100mm
    c. both (a) & (b) * d. Neither (a) nor (b)

42. Lathe bed is made of
    a. Pure Iron b. Malleable Cast Iron
    c. Alloy Steel d. Gray Cast Iron *

43. Gas or water pipes for underground purposes are made of
    a. Gray Cast Iron * b. White Cast Iron
    c. Malleable Cast Iron d. Stainless Steels.

44. Gray Cast Iron is used in making of
    a. Machine Tool Structure, Manhole covers, Cylinder blocks.
    b. Heads of IC Engines, Tunnel Segment
    c. Rolling Mill, Household Applications
    d. All of the above.*

45. Malleable Cast Iron is obtained from
    a. Gray Cast Iron
    b. Hard & Brittle White Iron *
    c. Wrought Iron.
    d. Alloy Steels

46. A Ferrite Malleable Cast Iron has
    a. Ferrite Matrix * b. Pearlite Matrix
    c. Both (a) & (b) d. Neither (a) nor (b)

47. A pearlite Malleable cast Iron has
 a. Ferrite Matrix b. Austenite Matrix
 c. Carbide Matrix d. None of the above *

48. Malleable Cast Iron Possesses
 a. Low yield strength b. High yield strength *
 c. Medium yield strength d. No yield strength

49. Malleable Cast Iron has
 a. High Young's Modulus
 b. High Coefficient of thermal expansion
 c. Low Coefficient of thermal expansion
 d. Both (a) & (c) *

50. Malleable cast Irons are used in
 a. Rail road & Automotive industry
 b. Agricultural Implements
 c. Gear Case & Universal Joint yoke
 d. All of the above *

51. Automotive Crankshaft is made of
 a. Gray Cast Iron b. Malleable Cast Iron *
 c. Alloy Steels d. Nodular Iron.

52. In Nodular cast Iron graphite appears as
 a. Rounded Particles b. Nodules
 c. Spheroids d. All of the above *

53. Nodular Cast Iron can be turned at
 a. Very high speeds b. Very high feeds
 c. Both (a) & (b) * d. Neither (a) nor (b)

54. The properties of nodular Cast Iron depend upon the
 a. Metal composition b. Cooling rate
 c. Both (a) & (b) * d. Heating rate

55. Carbon percentage in nodular Cast Iron varies from
 a. 3 to 4 b. 3.2 to 4.2 *
 c. 5.2 to 6.2 d. 4.3 to 6.2

56. Nodular Cast Iron possesses
 a. Low Wear Resistance
 b. Low Castability
 c. Excellent castability & wear resistance *
 d. None of the above.

57. Nodular Cast Iron possesses damping capacity
 a. More than steels
 b. Less than steels
 c. More than Cast Irons
 d. Between cast Iron & Steel *

58. Nodular Cast Irons are used in
 a. Paper Industry * b. Plastic Industry
 c. Quality Control Dept. d. All of the above.

59. Iron Carbide is
 a. Very Hard * b. Ductile
 c. Soft d. None of the above.

60. White cast iron possesses
 a. Bad abrasive wear resistance
 b. Average abrasion wear resistance
 c. Excellent abrasive wear resistance *
 d. None of the above.

61. White cast iron under normal circumstances
 a. brittle * b. Machinable
 c. Easy to Machine d. Is ductile

62. Percentage of Carbon in white cast iron is
 a. 1.8 to 7% b. 1.8 to 3.6% *
 c. 2 to 4% d. 2.1 to 3.5%

63. Percentage of Si in White cast iron is
 a. .3 to 1.2% b. 0.5 to 2.0% *
 c. 1 to 2.7% d. 2 to 5%

64. The solidification range of white cast iron is
 a. 700 -200°F b. 2400-1000°F
 c. 2550-2065°F * d. None of the above.

65. White cast irons are used in producing
 a. Gray Cast Iron b. Nodular Cast Iron
 c. Malleable Cast Iron * d. Graphite

66. Meehanite is the proprietory name for a patented series of high duty cast Irons inoculated with
 a. Calcium Phosphate b. Calcium Carbide
 c. Calcium Silicide * d. None of the above.

67. Calcium Silicide acts as a
 a. Anodiser b. Carburiser
 c. Enhibitor d. Graphitizer *

68. In meehanite carbon content varies between
 a. 2.5% b. 2.5 to 5%
 c. 2.5 to 3% * d. 2.5 to 10%

69. Meehanite has
 a. Vibration damping capacity less than cast Iron
 b. Low Creep resistance
 c. Good Creep resistance (662°F to 842°F) *
 d. None of above.

70. Machining of Meehanite castings may be improved by
 a. Case hardening b. Carburizing
 c. Annealing * d. All of the above.

71. A Plain Carbon Steel is an alloy of
 a. Iron & Silicon b. Carbon & Silicon
 c. Iron & Carbon * d. Silicon & Manganese

72. Carbon steels are different from cast irons with regards to :
 a. The % of Carbon *
 b. The % of Manganese
 c. The % of Mg
 d. All of the above.

73. Carbon steels contain carbon
a. From 0.10 to 4.5% b. From 0.20 to 3.5%
c. From 0.10 to 1.5% * d. From 0.20 to 1.5%

74. Commercially used Cast Iron Possesses Carbon from
a. 1.8 to 3.2% b. 1.8 to 4.2% *
c 1.8 to 2.2% d. 1.8 to 7%

75. Mild steels are also called as
a. High Carbon Steel b. Medium Carbon Steel
c. Hard Carbon Steel d. Low Carbon Steels *

76. In dead Mild Steel Carbon varies from
a. 2.02 to 3.75% b. .09 to 1.12%
c. .05 to 0.15% * d. .05 to .07%

77. Dead Mild Steel is used for making
a. Steel wire b. Sheets
c. Rivets d. Screws & pipes
e. All of the above *

78. Dead Mild Steel has tensile strength of
a. 410 N/mm^2 b. 370 N/mm^2
c. 390 N/mm^2 * d. 400 N/mm^2

79. The hardness of dead Mild Steel is
a. 175 BHN b. 125 BHN
c. 115 BHN * d. None of the above.

80. Medium Carbon steels contain carbon from
a. 0.30 to 0.40 b. 0.30 to 0.50
c. 0.30 to 0.60 d. 0.30 to 0.70 *

81. Connecting rods are made of
a. Medium Carbon Steels *
b. Malleable Cast Iron
c. Cast Iron
d. Low Carbon Steels

82. Gear Shafts are made of
a. Medium carbon steel *
b. Low carbon steel
c. High carbon steel
d. None of the above.

83. Steels containing 0.35 to 0.45% carbon have a tensile strength of
a. 450 N/mm^2 b. 550 N/mm^2
c. 650 N/mm^2 d. 750 N/mm^2 *

84. Steels containing 0.45 to 0.55% carbon have a tensile strength of
a. 1000 N/mm^2 * b. 900 N/mm^2
c. 800 N/mm^2 d. 700 N/mm^2

85. Steels containing 0.6 to 0.7% carbon have a tensile strength of
a. 1210 N/mm^2 b. 1200 N/mm^2
c. 1230 N/mm^2 * d. 1250 N/mm^2

86. Steel which is containing 0.6 to 0.7% carbon is used to manufacture
a. Clutch discs b. Plate Punches
c. Drop forging dies d. Valve springs
e. All of the above *

87. High Carbon steels contain carbon from
a. 0.3 to 1.8% b. 0.7 to 1.5% *
c. 0.2 to 1.5% d. 0.4 to 1.5%

88. Steels containing 0.7 to 0.8% carbon have a tensile strength of
a. 1200 N/mm^2 b. 1300 N/mm^2
c. 1400 N/mm^2 * d. 1100 N/mm^2

89. Steels containing 1.3 to 1.5% carbon are used for making
a. Wire drawing dies.
b. Paper Knives.
c. Metal cutting saws
d. Tools for turning chilled cast iron
e. All of the above *

90. Steels containing 0.8 to 0.9% carbon have a tensile strength of about
a. 560 N/mm^2 b. 660 N/mm^2 *
c. 460 N/mm^2 d. 260 N/mm^2

91. Steels containing 0.8 to 0.9 % of carbon have hardness
a. 300 to 500 BHN b. 500 to 600 BHN *
c. 600 to 800 BHN d. None of the above.

92. Steels which are having hardness between 500 to 600 BHN are used to manufacture of
a. Rock drills * b. Connecting rod
c. Gear Shaft d. All of the above.

93. Steels containing 0.90 to 1.00 % carbon have a tensile strength of
a. 580 N/mm^2 * b. 680 N/mm^2
c. 480 N/mm^2 d. 1020 N/mm^2

94. Steels containing 0.89 to 1.0 % of carbon have hardness between
a. 250 to 400 BHN b. 350 to 500 BHN
c. 550 to 600 BHN * d. 550 to 600 BHN

95. Steels containing 1.0 to 1.1% carbon are used for making
a. Drop forging dies b. Die blocks
c. Clutch discs d. Railway springs *

96. Steels containing 1.1 to 1.2% carbon are used for making
a. Taps b. Thread Metal dies
c. Knives d. Twist drills
e. All of the above *

97. Steels containing 1.2 to 1.3% carbon are used for
a. Files b. Reamers
c. Metal cutting d. All of the above *

98. Alloy steels alter
   a. The properties of steel *
   b. Weight ratio of steel
   c. Both (a) & (b)
   d. Neither (a) nor (b)

99. Alloy steel possesses
   a. lesser hardenability
   b. Average hardenability
   c. Medium hardenability
   d. Greater hardenability *

100. Alloy Steels have
   a. Average distortion and cracking
   b. Less distortion and Cracking *
   c. More distortion and Cracking
   d. No distortion and Cracking

101. Alloy steel possesses.
   a. Greater stress relief at given hardness *
   b. Lesser stress relief at given hardness
   c. Average stress relief at given hardness
   d. None of the above.

102. Higher Elastic Ratio and endurance strength shows that the material is
   a. Cast Iron b. Alloy Steel *
   c. Malleable d. All of the above.

103. Alloy steel possesses
   a. More grain growth b. Less grain growth *
   c. Average grain growth d. No grain growth

104. Alloy steel at high temperature possesses
   a. Greater strength * b. Lesser strength
   c. No strength d. None of the above.

105. Alloy Steels shows
   a. Better Machinability at high hardness *
   b. Poor Machinability
   c. Better Cracking
   d. All of the above.

106. Allow steel shows
   a. Greater ductility at high strength *
   b. Greater ductility at low strength
   c. Greater Brittleness at high strength
   d. All of the above.

107. The cost of Alloy steels is
   a. Zero b. High *
   c. Low d. Average

108. Alloy steels require
   a. Simple handling b. Special handling *
   c. Both (a) & (b) d. Neither (a) nor (b)

109. The tendency of Alloy steel towards austenite retention is
   a. Advantage b. Doesn't affect
   c. Disadvantage *

110. Purpose of Alloying is to improve
   a. Corrosion
   b. Corrosion Resistance *
   c. Cracking
   d. Blow holes

111. Purpose of Alloying is to improve
   a. Strengthening to the ferrite *
   b. Strengthening to the graphite
   c. Both (a) & (b)

112. Alloying is done to the steel to
   a. Improve cutting ability
   b. Improve ductility
   c. Improve wear resistance
   d. Improve toughness
   e. All of the above *

113. Effect of carbon as a alloying element is
   a. To increase hardness
   b. To decrease hardness
   c. To increase tensile strength
   d. Both (a) & (c) *

114. Carbon content in steel affects
   a. Machinability b. Melting Point
   c. Neither (a) nor (b) d. Both (a) & (b) *

115. Nickel as a alloying element
   a. Increases toughness *
   b. Decreases toughness
   c. Doesn't affect toughness
   d. None of the above

116. --------------------------- as a alloying element lowers the critical temp. of steel and widens the range of successful heat treatment.
   a. Nickel * b. Carbon
   c. Copper d. Aluminium

117. By adding .... we can strengthen steels
   a. Carbon b. Zinc
   c. Nickel * d. Copper
   e. None of the above.

118. Nickel
   a. Unites with carbon.
   b. Does not unite with Carbon. *
   c. Depends on porosity.
   d. Depends on toughness.

119. -------------------- improves oxidation resistance.
   a. Nickel b. Copper
   c. Silicon * d. All of the above.

120. Silicon as a alloying element
   a. Strengthens low alloy steel *
   b. Decrease strength.
   c. Acts as a oxidiser
   d. None of the above.

121. In steel silicon acts as a
a. Oxidiser b. Deoxidizer *
c. Inhibitor d. All of the above.

122. --------------------------- prevents localized depletion of chromium in stainless steel during long heating.
a. Silicon b. Copper
c. Zinc d. Titanium *

123. -------------------- prevents formation of austenite in high chromium steels.
a. Titanium * b. Zinc
c. Aluminium d. Tungsten

124. Molybdenum
a. Promotes hardenability of steels.
b. Decreases hardenability of steels.
c. Doesn't affect hardenability of steels.
d. Makes steel fine grained.
e. (a) & (d) both *

125. -------------------- reduces Martensitic hardness and hardenability in medium carbon steels.
a. Zinc b. Molybdenum
c. Titanium * d. All of the above.

126. --------------------- makes steel unusually tough at various hardness levels.
a. Nickel b. Molybdenum *
c. Titanium d. Carbon

127. -------------------- counteracts the tendency of steel towards the temper brittleness.
a. Carbon b. Titanium
c. Molybdenum * d. All of the above.

128. ----------------- raises tensile and creep strength at high temperatures.
a. Nickel b. Carbon
c. Titanium d. Molybdenum *

129. ----------------- enhances corrosion resistance in stainless steels.
a. Molybdenum * b. Titanium
c. Nickel d. Copper

130. -------------------- forms abrasion resisting particles.
a. Copper b. Titanium
c. Molybdenum * d. Carbon

131. Vanadium
a. Promotes fine grains in steel.
b. Increases Hardenability.
c. Imparts strength and toughness to heat treated steel.
d. All of the above *

132. Tungsten as a alloying element
a. Increases hardness * b. Decreases hardness
c. Neither increases nor decreases
d. Decreases red hardness

133. -------------------- resists heat as a alloying element.
a. Vanadium b. Titanium
c. Tungsten * d. Molybdenum

134. -------------------- lowers both ductility and weldability if it is present in high percentage with high carbon content in steels.
a. Copper
b. Nickel
c. Manganese *
d. None of the above.

135. If 0.2 to 0.5% copper is added in steels it
a. Increases resistance to atmospheric corrosion *
b. Decreases resistance to atmospheric corrosion.
c. resist the temperature.
d. Not predictable

136. ----------------- acts as a strengthening agent
a. Copper * b. Nickel
c. Zinc d. Aluminium

137. -------------------- increases hardenability or depth to which steel will harden when quenched
a. Copper b. Nickel
c. Boron * d. Zinc

138. Aluminium acts as a -----------------
a. Deoxidiser * b. Oxidiser
c. Inhibitor d. Exhibitor.

139. .... produces fine Austenite grain size.
a. Zinc b. Aluminium *
c. Copper d. Boron

140. ------------------ Contributes to red hardness by hardening ferrite.
a. Boron b. Cobalt *
c. Aluminium d. Tungsten.

141. -----------------refines the graphite & pearlite.
a. Cobalt * b. Vanadium
c. Titanium d. Nickel

142. Mild stabilizer of carbides is
a. Nickel b. Titanium
c. Vanadium d. Cobalt *

143. ------------------- retards the transformation of austenite and thus increases hardenability and freedom from cracking and distortion.
a. Cobalt * b. Nickel
c. Vanadium d. Tungsten

144. ----------------- stabilizes cementite and improves the structure of chill.
a. Molybdenum b. Cobalt
c. Titanium d. Vanadium *

145. Which one is the prominent alloy steel ?
   a. Silicon steel
   b. Silicon-Manganese steel
   c. Nickel Steel
   d. Chrome-Nickel steel
   e. All of the above *

146. Silicon steel contains Carbon
   a. 0.10% * b. 0.20%
   c. 0.30% d. 0.40%

147. Silicon steel contains Manganese upto
   a. 60% b. 6.0%
   c. 0.60% * d. 0.06%

148. In Silicon steel % of Si is
   a. 1.00% * b. 2.00%
   c. 3.00% d 4.00%

149. In silicon steel___________ imparts strength and fatigue resistance and improves electrical properties of steel.
   a. C b. Mn
   c. Si * d. Al

150. Many bridge have been built of SiC steel, which is called
   a. Copper structural steel.
   b. Carbon structural steel.
   c. Silicon structural steel *
   d. Boron structural steel.

151. Silicon Manganese steels contain carbon from
   a. 0.40 to 0.55% * b. 0.40 to 2.00%
   c. 0.40 to 2.23% d. 0.40 to 2.24%

152. Silicon Manganese steel contain from
   a. 0.04 to .08% Si b. 0.04 to 1.8% Si *
   c. .08 to 1.3% Si d. .06 to 1.2% Si

153. Silicon Manganese Steel contain
   a. 0.9 to 1.0 Mn * b. 0.9 to 1.8 Mn
   c. 0.9 to 2.3 Mn d. 0.8 to 2.3 Mn

154. Silicon -Manganese steels are used to manufacture
   a. Punches b. Chiesels
   c. Both (a) & (b) * d. Neither (a) nor (b)

155. Nickel steel contains
   a. 0.30% Carbon b. 0.40 Carbon
   c. 0.35% Carbon * d. 0.50% Carbon

156. In Nickel steel, Nickel varies upto
   a. 2.5% b. 3.5% *
   c. 6.5% d. 4.5%

157. Addition of Nickel to structural steel results in an increase of
   a. Strength * b. Distortion
   c. Cracking d. None of the above.

158. Nickel steels are used for
   a. Complex structures
   b. Fins
   c. Storage Cylinders *
   d. None of the above.

159. Nickel steels are used in
   a. Heavy forging
   b. Turbine blades
   c. Highly stressed screws
   d. All of the above *

160. Chrome - Nickel steel contain
   a. 0.35 % C * b. 0.45 % C
   c. 0.50 % C d. 0.60 % C

161. Chrome-Nickel steel contain
   a. 1.45% Ni b. 1.35% Ni
   c. 1.25% Ni * d. 1.15% Ni

162. Chromium -Nickel Steel contains
   a. 0.40% Cr b. 0.50% Cr
   c. 0.60% Cr * d. 0.70% Cr

163. In chrome vanadium steel carbon varies up to
   a. 0.20% b. 0.22%
   c. 0.24% d. 0.26% *

164. In chrome vanadium steel chromium varies upto
   a. 0.72% b. 0.82%
   c. 0.92% * d. 1.02%

165. Molybdenum steel contains
   a. 0.25% carbon b. 0.15% carbon
   c. 0.35% carbon * d. 0.45% carbon

166. Molybdenum steel contains
   a. 0.76% Mo * b. 0.66% Mo
   c. 0.56% Mo d. 0.46% Mo

167. Molybdenum steels are used in manufacture of
   a. Aircraft landing gear b. Coil leaf spring
   c. Pressure Vessel d. All of the above *

168. In chrome-Molybdenum steel carbon varies upto
   a. 0.35% * b. 0.45%
   c. 0.55% d. 0.65%

169. Chrome-Molybdenum steel contains
   a. 1.04% Cr b. 1.06% Cr *
   c. 1.26% Cr d. 1.24% Cr

170. Chrome-Molybdenum steel contains
   a. 0.80% Mo b. 0.30% Mo
   c. 0.36% Mo * d. 0.96% Mo

171. Cobalt Sheets are used where
   a. No frictional heats are developed.
   b. High frictional heats are developed *
   c. Low frictional heats are developed.
   d. None of the above.

172. Cobalt imparts additional
a. Red hardness * b. Hot hardness
c. Red softness d. High toughness

173. Steels have been classified on the basis of
a. Mechanical Properties b. Chemical Properties
c. Both (a) & (b) * d. Neither (a) nor (b)

174. Symbol for Rimming steel is
a. R * b. K
c. RS d. Rs

175. Symbol for killed steel is
a. K * b. Ks
c. N d. P

176. Symbol for Semi-killed steel is
a. Ks b. SK
c. $K^{1/2}$ s. No Symbol
d. No Symbol for Semi Killed steel *

177. Symbol for Non ageing quality is
a. Q_2 b. Q_1 *
c. Q_3 d. Q_4

178. Symbol for freedom for flakes in quality is
a. Q_2 * b. Q_1
c. F.Q d. None of the above.

179. In quality of Steel, the symbol for given size controls
a. Q_1 b. Q_2
c. Q_3 * d. Q_4

180. Symbol for inclusion controlled in quality of steel is
a. Q_1 b. Q_2
c. Q_3 d. Q_4 *

181. In quality of steel when the internal homogeneity guaranteed it is represented by
a. Q_1 b. Q_5 *
c. Q_3 d. Q_2

182. When sulphur & Phosphorus content in steels are same that steel is represented by
a. S equal b. S=P
c. $S_{s=p}$ d. No symbol *

183. In case of tool steel, ----------------- of form takes place during hardening
a. Slight change *
b. Large change
c. No change
d. Depends on temperature

184. In case of tool steel, little risk of ----------------- exists during hardening
a. Blow holes b. Cracking *
c. Scabs d. None of the above.

185. Tool steel possesses
a. Good toughness * b. Bad toughness
c. Good softness d. All of the above.

186. Tool steel possesses
a. Good softness
b. Good cracking capability
c. Good wear resistance *
d. Bad wear resistance

187. Tool steel possesses
a. Bad Machinability
b. Average Machinability
c. Very good Machinability *
d. None of the above.

188. Tool steel shows a definite cooling rate during-----------------
a. Hardening * b. Softening
c. Machining d. None of the above.

189. Tool steel shows
a. Definite critical point for cooling
b. Definite cooling rate during hardening
c. Definite hardening temperature
d. Both (b) & (c) *

190. Tool steel possesses good resistance to -----------------
a. Oxidation b. Carburization
c. Decarburization * d. None of the above.

191. Tool steel possesses resistance to ------------------- on heat (red hardness)
a. Softening b. Hardening *
c. Carburizing d. None of the above

192. The joint Industry conference (JIC) in ------------------ has classified tool steel.
a. U.S.A. * b. Canada
c. Nepal d. Germany

193. Tool steel should be kept at proper temperature and sufficient time so that the whole of the tool section get heated uniformly.
a. True statement *
b. False statement

194. In the case of heat treatment -------------- should be avoided.
a. Under heating b. Over heating *
c. Sub cooling d. All of the above.

195. Protective furnace atmosphere or any other method should be employed to avoid ----------------- of tool steel during heating
a. Scaling or decarburization *
b. Carburization.
c. Deoxidation
d. None of the above.

196. Carbon & low alloy steels may be quenched in water or brine and high alloy steel in oil, air, or molten salts.
a. True statement * b. False statement

197. ----------------- should be tempered immediately after quenching and before they cool to room temperature.
a. Tool steel * b. Cast Iron
c. Malleable Iron d. All of the above.

198. Stainless steel contains
a. 11.5% or more chromium *
b. 10.5% or more chromium
c. 29% or more chromium
d. 32% or more chromium

199. In stainless steel the film developed on the surface is of
a. Chromium Oxide * b. Silicon Oxide
c. Thorium Oxide d. Thorium Sulphate

200. The steel which cannot be stained easily known as
a. Alloy steel b. High speed steel
c. Stainless steel * d. None of the above.

201. All stainless steels can be grouped in to the three metallurgical classes on the basis of their
a. Microstructure * b. Grain boundaries
c. Corrosion resistance d. All of the above.

202. Austenitic stainless steel possess austenitic structure at
a. 900°C b. 1800°C
c. 2700°C d. Room temperature *

203. Austenitic stainless steel possess the ----------------------- corrosion resistance of all the stainless steels.
a. Highest * b. Lowest
c. Medium d. No

204. Austenitic stainless steel possess greatest strength and scale resistance at
a. High temperature * b. Low temperature
c. Both (a) & (b) d. Neither (a) nor (b)

205. ----------------- retains ductility at temperature approaching absolute zero
a. Austenitic stainless steel *
b. Ferritic stainless steel.
c. Martensitic stainless steel.
d. Pearlitic stainless steel.

206. Austenitic stainless steels are
a. Magnetic
b. Non Magnetic *
c. Less chromium steels (below 2% Cr)
d. None of the above.

207. Austenitic stainless steels are easily identified by a
a. Powder of Iron & Chromium
b. Wood. c. Magnet *
d. All of the above.

208. Austenitic stainless steel contains carbon between
a. .03 to .020% b. .03 to .021%
c. .03 to .002% d. .03 to .025% *

209. Austenitic stainless steels are used in
a. Aircraft Industry b. Chemical Processing
c. Food Processing d. Household Items
e. All of the above *

210. Ferritic stainless steel have a ------------------ carbon to chromium ratio.
a. Low * b. Average
c. High d. No

211. Low carbon to chromium ratio of ferritic stainless steels eliminates the effect of -----------------
a. Cracking
b. Chemical Transformation
c. Thermal Transformation *
d. All of the above.

212. Ferritic stainless steels are of ------------------ nature.
a. Magnetic * b. Non Magnetic
c. Brittle d. None of the above.

213. Ferritic stainless steels possess
a. Good Brittleness b. Good hardness
c. Good ductility * d. None of the above.

214. -------------------- steels do not work harden to any appreciable degree.
a. Ferritic stainless * b. Austenitic stainless
c. Martensitic stainless d. All of the above.

215. Ferritic steels are less corrosion resistant than martensitic steels.
a. True statement b. False statement *

216. Ferritic steels are more corrosion resistant than
a. Austenitic stainless steels.
b. Pearlitic stainless steels.
c. Both (a) & (b)
d. Neither (a) nor (b) *

217. Ferritic steels develop their maximum softness ductility and corrosion resistance in the condition.
a. Annealed * b. Normalized
c. Hardened d. Carburized

218. In ferritic stainless steel carbon contents vary from
a. .08 to 0.70% b. .08 to 0.30%
c. .08 to 0.20% * d. .08 to 0.50%

219. In ferritic steels Cr varies between
a. 11 to 29% b. 11 to 27% *
c. 11 to 26% d. 11 to 38%

220. Ferritic stainless steel are used in
a. Aircraft Industry b. Frame of Aircraft
c. Screw & Fittings * d. None of the above.

221. Martensitic stainless steels are identified by their martensitic microstructure in the
a. Annealed condition b. Normalized condition
c. Hardened condition * d. All of the above.

222. Martensitic stainless steel have --------------- carbon to chromium ratio
a. Low b. High *
c. Average d. None of the above.

223. Due to higher carbon to chromium ratio martensitic stainless steel are the only types hardenable by ---------------
a. Heat treatment * b. Sub cooling
c. Both (a) & (b) d. Neither (a) nor (b)

224. Martensitic stainless steels are ------------------ in all conditions.
a. Non Magnetic b. Magnetic *
c. Basic d. None of the above.

225. Martensitic stainless steel possesses
a. Poor thermal conductivity.
b. Average thermal conductivity.
c. Best thermal conductivity *
d. Poor electrical conductivity.

226. Martensitic stainless steel can be
a. Cold worked with difficulty.
b. No cold working is possible.
c. Cold worked *
d. None of the above.

227. Martensitic stainless steel possesses
a. Good toughness * b. Poor toughness
c. Good Softness d. None of the above.

228. Martensitic stainless steel possesses
a. Poor corrosion resistance.
b. No corrosion resistance.
c. Good corrosion resistance *
d. None of the above.

229. In Martensitic stainless steel carbon varies between
a. 0.15 to 1.2% * b. 0.15 to 1.3%
c. 0.15 to 1.4% d. 0.15 to 1.5%

230. In martensitic stainless chromium varies upto
a. 11.5 to 18% * b. 12.5 to 18%
c. 13.5 to 18% d. 14.5 to 18%

231. Martensitic stainless steel is used in the manufacture of
a. Aircraft Industry b. Turbine buckets
c. Pump and valve parts d. Both (b) & (c) *

232. Austenitic stainless steels are used in welded assemblies in preference of ferritic or martensitic stainless steel.
a. True statement * b. False statement

233. -------------------- steels removes metal at much higher speeds or rates than ordinary carbon steels.
a. Low carbon steel b. High speed steels *
c. Medium carbon steel d. None of the above.

234. High speed steels were developed and used primarily for making
a. Good surface finish b. Gear box casing
c. Metal cutting tools * d. All of the above.

235. High speed steels can retain their hardness up to
a. 540°C * b. 640°C
c. 740°C d. 840°C

236. High speed steels, above 540°C, rapidly ----------------
a. Gained in hardness
b. Softens
c. softens & loose their cutting ability *
d. None of the above.

237. High speed steel shows
a. Poor red hardness
b. Good red hardness
c. Excellent red hardness *
d. Average red hardness

238. High speed steel possesses ------------------- wear resistance.
a. Good * b. Average
c. Poor d. No

239. High speed steel possesses
a. Difficulty in machining.
b. Difficulty in cutting.
c. Fair machinability *
d. None of the above.

240. High speed steel possesses ------------------- shock resistance.
a. Poor b. Average
c. Good * d. No

241. High speed steel possesses
a. Good non deforming property *
b. Good deforming property.
c. Bad non deforming property.
c. Bad deforming property.

242. High speed steel possesses.
a. Poor resistance to oxidation.
b. Poor resistance to deoxidation.
c. Poor resistance to carburization.
d. Poor resistance to decarburization *

243. Two main type of high speed steels are
a. Tungsten base & Molybdenum base *
b. Cu base & Ni base
c. Tungsten base & copper base.
d. Copper base & Molybdenum base.

244. As compare to tungsten base steels molybdenum base steels are
 a. Adequate & Cheap *
 b. Of high cost
 c. Depends on Market stock
 d. None of the above.

245. Carbon in high speed steels are added for
 a. High hardness * b. Low hardness
 c. High softness d. None of the above.

246. In high speed steels, chromium is added for
 a. Ease of heat treating *
 b. To raise hardness number
 c. To increase ductility
 d. All of the above.

247. In high speed steels vanadium is added for
 a. Crack detection
 b. To improve corrosion resistance.
 c. Grain refining *
 d. None of the above.

248. In high speed steels cobalt is added for
 a. Additional softness b. Additional toughness
 c. Additional Hardness * d. None of the above.

249. Drills are made of
 a. High Carbon Steel b. High speed steel *
 c. Low carbon steel d. Medium carbon steel.

250. Taps & Reamers are made of
 a. Low carbon steel b. Alloy steel
 c. Cast Iron d. High speed steel *

251. Uletra high speed steels have
 a. Less hardness b. Small tool life
 c. Longer tool life * d. None of the above

252. Heat resisting steels are meant for use at
 a. Low temperature b. Medium temperature
 c. Average temperature d. High temperature *

253. Heat resisting steel offers high resistance to -----------
 a. Carburization b. Oxidation *
 c. Deoxidation d. Decarburization

254. Heat resisting steel offer high resistance to ------------
 a. Cracking b. Scab
 c. Hot tear d. Scaling *

255. Heat resisting steel possess
 a. Low creep resistance
 b. Medium creep resistance
 c. High creep resistance *
 d. None of the above.

256. In heat resisting steels chromium improves resistance to
 a. Carburization b. Oxidation *
 c. Deoxidation d. Decarburization

257. Tungsten & Molybdenum in heat resisting steels improve
 a. Creep resistance * b. Cracking
 c. Distortion d. Deformation

258. Hadfield's manganese steel is an
 a. Austenitic steel * b. Martensitic steel
 c. Pearlitic steel d. None of the above.

259. Hadfield's manganese steel possess
 a. Poor strength b. Average strength
 c. Excellent strength * d. None of the above.

260. Hadfield's manganese steel possess
 a. Good toughness
 b. high wear resistance under impact loads
 c. Both (a) & (b) * d. Neither (a) nor (b)

261. Hadfield's manganese steel contains carbon between
 a. 1.2 to 2.2% b. 1.2 to 1.4% *
 c. 1.2 to 2.0% d. 1.2 to 4.2%

262. Hadfield's manganese steel contains Mn between
 a. 10 to 30% b. 10 to 18%
 c. 10 to 14% d. 12 to 14% *

263. Hadfield's manganese steel is austenized by heating it to
 a. 800 to 1600°C b. 1050 to 20°C
 c. 1050 to 100°C * d. 850 to 1750°C

264. Hadfield manganese steel is plastically deformed on the surface by hammering to convert the austenite at the layer to
 a. Ferrite b. Martensite *
 c. Pearlite d. None of the above.

265. The upper layer of martensite in case of Hadfield manganese steel is
 a. Extremely soft b. Extremely brittle
 c. Extremely hard * d. None of the above.

266. The martensite layer in case of Hadfield manganese steel gives excellent
 a. Wear resistance * b. Toughness
 c. Cracking d. All of the above.

267. In Aluminium die casting which steel is used
 a. High speed steel b. Low speed steel
 c. High carbon steel d. Maraging steel *

268. Maraging steel are
 a. Low carbon steel * b. High carbon steel
 c. High speed steel d. None of the above.

269. Maraging steels are
 a. High Nickel Alloy steel * b. Low Nickel Alloy steel
 c. High speed steels d. None of the above.

270. Extrusion dies are made of
 a. Maraging steel * b. High carbon steel
 c. Low carbon steel d. None of the above.

■■■

CHAPTER - 18
NON FERROUS MATERIAL

1. Non Ferrous metals are not
   a. Iron based * b. Copper based
   c. Zinc based d. None of the above.

2. Copper is a
   a. Ferrous materials
   b. Non Ferrous materials *
   c. Ceramic materials
   d. None of the above.

3. The main grades of raw copper used to -------------- copper base alloys.
   a. Cast * b. Weld
   c. Superfinish d. None of the above.

4. High conductivity copper (electrolytic) is having not less than
   a. 99.9% Cu * b. 92.8 % Cu
   c. 90.2 % Cu d. 32.43 % Cu.

5. In high conductivity copper (electrolytic) the oxygen content may be of the order of
   a. 1.20% b. 0.20%
   c. 0.40% * d. 0.70%

6. Deoxidised copper is having not less than ________ copper contents :
   a. 11.25% b. 99.85% *
   c. 39.2% d. 39.7%

7. Arsenic deoxidised copper having 0.4% As, 0.04% P and remaining copper is used for
   a. Welding vessels b. Tanks
   c. Both (a) & (b) * d. Neither (a) nor (b)

8. Copper possesses --------------------- resistance to corrosion
   a. Good b. Bad
   c. Excellent * d. Average

9. Copper shows
   a. Magnetic Properties
   b. Non-Magnetic Properties *
   c. Bad resistance to corrosion
   d. None of the above.

10. Copper is
    a. Ductile b. Malleable
    c. Easy to work d. All of the above *

11. Copper possess ------------------ hardness & strength.
    a. Low b. Excellent
    c. Moderate * d. No

12. Electrical & thermal conductivity of copper is
    a. Bad b. High *
    c. Poor d. None of the above.

13. Copper shows good resistance to fatigue abrasion and corrosion.
    a. True statement * b. False statement

14. Copper can be
    a. Soldered b. Brazed
    c. Welded d. All of the above *

15. Copper possess
    a. Less wear resistance.
    b. Less corrosion resistance *
    c. Very good Machinability
    d. All of the above.

16. Copper is used for ---------------------------
    a. Electrical parts * b. Caterpillars
    c. Jaw crusher plates d. Coal grinding mill

17. Brass & Bronze are the alloys of
    a. Copper * b. Lead
    c. Aluminium d. Zinc

18. Copper is used in
    a. Heat exchangers
    b. Screw Machine products
    c. Both (a) & (b) *
    d. Neither (a) nor (b)

19. High copper alloys contain __________ copper
    a. 96 to 99.3% * b. 92 to 94%
    c. 91 to 97% d. 84 to 89%

20. Brasses contain ------------------ as the principle alloying element.
    a. Aluminium b. Lead
    c. Zinc * d. Cr

21. Leaded Brasses are combination of
    a. Zn-Pb-Al b. Cu-Pb-Zn *
    c. Cu-Pb-Al d. Cu-Al-Zn

22. Tin Brasses are combination of
    a. Cu-Zn-Sn * b. Cu-Al-Sn
    c. Sn-Al-Pb d. Cu-Sn-Al

23. Brasses acts as a good -------------------
    a. Exhibitors b. Inhibitors
    c. Bearing Material * d. None of the above.

24. Zinc in the brass increases ------------------- along with strength
    a. Softness   b. Brittleness
    c. Ductility *   d. None of the above

25. Brass possess ------------------- strength than copper.
    a. Less   b. More *
    c. Equal to   d. None of the above.

26. Brasses has__________ thermal & electrical conductivity as compared to copper.
    a. Low *   b. High
    c. Equal   d. None of the above.

27. In Gilding Metal Zn varies from
    a. 5 to 10%   b. 5 to 15% *
    c. 5 to 25%   d. 15 to 25%

28. Gilding metals are supplied mainly in the form of
    a. Sheet strips   b. Wire
    c. Both (a) & (b) *   d. Neither (a) nor (b)

29. Like copper, Gilding Metal is hardened & strengthened by
    a. Case hardening   b. Cold work *
    c. Hot work   d. None of the above.

30. Gilding Metal is used for making
    a. Electrical parts   b. Heat exchanger
    c. Coins *   d. All of the above.

31. Cartridge brass normally contains Cu upto
    a. 40%   b. 70% *
    c. 80%   d. 90%

32. Cartridge brass normally contain Zn upto
    a. 20%   b. 30% *
    c. 40%   d. 50%

33. In the fully annealed condition cartridge has a tensile strength of
    a. 500 N/mm^2 b. 400 N/mm^2
    c. 300 N/mm^2 *   d. 900 N/mm^2

34. Greater % elongation and tensile strength make this brass satisfactory for
    a. Cold Deformation *
    b. Hot Deformation
    c. Any kind of Deformation
    d. No Deformation

35. Cartridge brass work hardens when deformed in the cold, and must be annealed if many successive operations are to be performed.
    a. True statement *
    b. False statement.

36. Admiralty brass contains Cu upto
    a. 69%   b. 70%
    c. 71% *   d. 74%

37. Admiralty brass contains Zn upto
    a. 20%   b. 22%
    c. 26%   d. 28% *

38. Admiralty brass contain Sn upto
    a. 1% *   b. 2%
    c. 3%   d. 4%

39. In admiralty brass tin is added to improve
    a. Softness
    b. Ductility
    c. Corrosion resistance *
    d. None of the above.

40. Aluminium brass contain Cu upto
    a. 70%   b. 72%
    c. 74%   d. 76% *

41. Aluminium brass contain Zn upto
    a. 15%   b. 20%
    c. 22% *   d. 28%

42. Aluminium brass contain Zn upto
    a. 2% *   b. 1%
    c. 7%   d. 4%

43. Basic brass contains copper upto
    a. 60 to 80%   b. 65 to 92%
    c. 61.5 to 64% *   d. 62 to 74%

44. Basic brass is used for -------------------- where a relative cheap material is required.
    a. Press work *   b. Smithy work
    c. Weld work   d. None of the above.

45. Muntz metal or yellow metal contain Cu upto
    a. 40%   b. 30%
    c. 50%   d. 60% *

46. Muntz metal is also called as
    a. Black metal   b. Green metal
    c. Yellow metal *   d. None of the above.

47. Muntz metal contains Zn upto
    a. 40% *   b. 50%
    c. 60%   d. 70%

48. Muntz metal is manufactured in the form of
    a. Hot rolled plate *   b. Cold rolled plate
    c. Wires   d. None of the above.

49. Yellow metal is frequently used as a --------------------- for steel.
    a. Welding Alloy   b. Brazing Alloy *
    c. Soldering Alloy   d. None of the above.

50. Muntz metals are used in manufacture of
    a. Perforated Metal   b. Condenser tubes
    c. Valve stems   d. All of the above *

51. Lead is added to Cu-Zn Alloy to promote
a. Machinability * b. Softness
c. Hardness d. Ductility

52. Leaded brass is used for
a. Keys & Valve parts b. Lock parts
c. Gears d. Clock parts
e. All of the above *

53. Naval brass contains Cu upto
a. 50% b. 60% *
c. 70% d. 80%

54. % of Zn in Naval Brass is
a. 31.25% b. 33.25%
c. 37.25% d. 39.25% *

55. % of Sn in Naval Brass is
a. 0.25% b. 1.50%
c. 2.20% d. 0.75% *

56. The purpose of Tin is to improve the resistance to corrosion in case of naval brass
a. True statement * b. False statement

57. Naval brass is used for structural application and for forgings, especially in cases where contact with sea water is likely to induce.
a. Cracking b. Distortion
c. Deformation d. Corrosion *

58. Naval brass is obtainable as
a. Hot rolled plate * b. Cold rolled plate
c. Wires d. None of the above.

59. Naval brasses are used in
a. Bearings b. Propeller shaft *
c. Gear casing d. All of the above.

60. Admiralty brass contain Cu upto
a. 70% b. 71% *
c. 72% d. 73%

61. Admiralty brass contain Zn upto
a. 28% * b. 32%
c. 44% d. 47%

62. Bronze is a broad term defining an alloy of
a. Cu & Sn *
b. Cu & Zn
c. Cu & Ni & Zn
d. Cu & elements other than Ni & Zn

63. Bronze possess ------------------ mechanical properties and corrosion resistance than brass.
a. Bad b. Superior *
c. Equal d. None of the above.

64. Bronze is basically an alloy of
a. Cu & Sn * b. Cu & C
c. Cu & Al d. Cu & Ni

65. Bronze is comparatively ------------------ than brass
a. Softer b. Harder *
c. Both (a) & (b) d. Neither (a) nor (b)

66. Bronze resists surface wear
a. True statement * b. False statement

67. Bronze can be shaped or rolled into
a. Wire b. Rod
c. Sheets d. All of the above *

68. In Phosphor Bronze, phosphor contents varies upto
a. 0.25 b. 0.45
c. 0.35 * d. 0.55

69. The excess phosphorus, which exists in solid solution of phosphor bronze increases.
a. Softness b. Corrosion
c. Cracking d. Hardness *

70. A phosphor bronze containing approximately 4% each of tin, lead & zinc has excellent_______ characteristics.
a. Free Cutting * b. Casting
c. Welding d. None of the above.

71. Content of standard phosphor bronze for bearing application.
a. 90% Cu, 10% Sn, 0.5% P *
b. 80% Cu, 2% Sn, 2% P
c. 80% Cu, 8% Sn, 0.3% P
d. 90% Cu, 3% Sn, 3% P

72. In general phosphor bronze has
a. High strength b. High toughness
c. Both (a) & (b) * d. Neither (a) nor (b)

73. Phosphor Bronze is resistant to
a. Cracking b. Corrosion *
c. Both (a) & (b) d. Neither (a) nor (b)

74. Phosphor Bronze possess
a. Low toughness
b. High Coefficient of friction
c. Low Coefficient of friction *
d. None of the above.

75. Phosphor Bronze possess --------------------
a. Less strength
b. High Coefficient of friction
c. Good load bearing capacity *
d. None of the above.

76. Phosphor Bronze is used for bearing application & making.
a. Pump parts * b. Gears
c. Keys d. None of the above.

77. Aluminium bronzes possess
a. Less heat resistance. b. Good heat resistance *
c. No corrosion resistance
d. None of the above.

78. In Silicon Bronzes Si varies between
a. 1 to 8% b. 1 to 22%
c. 1 to 4% * d. 1 to 9%

79. In silicon Bronzes, lead is added to improve
a. Cracking b. Corrosion resistance
c. Machinability * d. All of the above.

80. Silicon Bronze can be ------------------ easily.
a. Cast b. Rolled
c. Forged d. All of the above *

81. Silicon Bronzes are used in
a. Electrical - Industries b. Air Craft - Industries
c. Marine Hardware * d. All of the above.

82. Gun metal is an alloy of
a. Cu, Sn & Zn * b. Cu, Sn & Al
c. Cu, Al & Zn d. Sn, Al & Zn

83. In Gun metal, ---------------------- cleans the metal and increases its fluidity.
a. Zirconium b. Zinc *
c. Aluminium d. Copper

84. In Gun metal lead may be added to improve
a. Castability b. Machinability
c. Both (a) & (b) * d. Neither (a) nor (b)

85. Admiralty Gun metals contain
a. 10% Sn * b. 20% Sn
c. 25% Sn d. None of the above.

86. Admiralty gun Metal contains Zn upto
a. 2% * b. 4%
c. 6% d. 8%

87. Nickel gun metal contains Ni upto
a. 3.5% b. 4.5%
c. 5.5% * d. None of the above.

88. Leaded gun metal contains Pb upto
a. 3% b. 15%
c. 20% d. 5% *

89. Aluminium is a -------------------- metal.
a. Pure white b. Silvery white
c. Grey white * d. None of the above.

90. Aluminium is a ----------------- metal.
a. Heavy weight b. Medium weight
c. Light weight * d. None of the above.

91. Aluminium is a ------------------ conductor of electricity.
a. Bad b. Very good *
c. Average d. None of the above.

92. Aluminium is a -------------- conductor after copper.
a. Better * b. Bad
c. Equal d. None of the above.

93. Aluminium possess higher resistance to
a. Fluidity b. Corrosion *
c. Castability d. All of the above.

94. Aluminium is ------------------ metal.
a. Magnetic b. Non-Magnetic *
c. Brittle d. None of the above.

95. Aluminium is very
a. Ductile * b. Brittle
c. Bad conductor of heat d. None of the above.

96. Melting point of pure Aluminium is about
a. 550% b. 850%
c. 950% d. 650% *

97. Fusion range of most of the Aluminium varies between
a. 600 to 800°C b. 400 to 500°C
c. 520 to 650°C * d. 300 to 900°C

98. Aluminium alloys are
a. Malleable b. Ductile
c. Both (a) & (b) * d. Neither (a) nor (b)

99. ---------------------- exihibit toughness and become stronger at temperatures below the ordinary atmospheric range.
a. Zinc b. Aluminium Alloys *
c. Pure Iron d. None of the above.

100. Aluminium Alloys do not work well at temperatures of the order of
a. 300 to 600°C b. 400 to 600°C
c. 500 to 600°C d. 300 to 400°C *

101. Aluminium & its alloys can be
a. Cast b. Welded
c. Forged d. Extruded
e. All of the above *

102. Overhead conductors and heat exchanger parts are made of
a. Copper
b. Aluminium & Al Alloys *
c. Zinc
d. Antimony

103. Cryogenic Application involves
a. Low temperature application *
b. High temperature application
c. Both (a) & (b)
d. Neither (a) nor (b).

104. Duralumin possesses
a. High Machinability *
b. Difficult to Machining
c. Bad castable properties
d. None of the above.

105. Duralumin contains Cu upto
a. 3.5 to 6.5% b. 3.5 to 10.5%
c. 2 to 4% d. 3.5 to 4.5% *

106. Duralumin possess, strength -------------------- steel.
a. Less than b. More than
c. As high as * d. None of the above.

107. Duralumin finds the uses in
a. Aircraft & Automobile parts *
b. Connecting rod
c. Piston
d. None of the above.

108. Duralumin possess excellent _________ charactaristics
a. Casting * b. Corrosion
c. Compressive strength d. None of the above.

109. Magnesium has the ---------------------- density of the common structural materials.
a. Lowest * b. Highest
c. Average d. None of the above.

110. Magnesium has a melting point of
a. 550°C b. 650°C *
c. 750°C d. 850°C

111. Magnesium is not employed in its --------------------
a. Alloy state b. Molten state
c. Pure state * d. None of the above.

112. Magnesium ----------------badly under many conditions and therefore need to be painted or given some surface finishing.
a. Corrodes * b. Carburizes
c. Oxidiser d. All of the above.

113. Magnesium is a very ------------------ metal.
a. Cheap b. High dense
c. Expensive * d. Both (a) & (b)

114. Magnesium Alloy possess
a. High strength to weight ratio *
b. Low strength to weight.
c. Less fatigue strength.
d. None of the above.

115. Magnesium Alloys possess
a. Good fatigue strength *
b. Poor fatigue strength
c. Poor damping capacity
d. None of the above.

116. Magnesium Alloy possess
a. Good damping capacity *
b. Poor fatigue strength
c. Both (a) & (b)
d. Neither (a) nor (b)

117. Thermal conductivity of magnesium alloys are
a. High * b. Poor
c. Average d. None of the above.

118. Magnesium Alloys are used in
a. Welding b. Casting
c. Aeroplanes * d. All of the above.

119. DOW Metal is a
a. Mg Alloy * b. Cu Alloy
c. Al Alloy d. Zn Alloy

120. DOW Metal contain Magnesium upto
a. 70% b. 80%
c. 90% * d. 85%

121. DOW Metal contain Aluminium upto
a. 40% b. 30%
c. 20% d. 10% *

122. DOW Metal finds applications in
a. Auto & aircraft industries *
b. Where heavy metal is required.
c. In press shop
d. None of the above.

123. DOW Metal is extremely
a. Heavy weight
b. Light weight *
c. Depends on carburization
d. None of the above.

124. DOW Metal can be
a. Welded b. Machined
c. Both (a) & (b) * d. None of the above.

125. Lead is the ------------------ metal of the heavy metals
a. Softest * b. Hardest
c. Heaviest d. None of the above.

126. Lead has low melting point of
a. 432°C b. 527°C
c. 623°C d. 327°C *

127. Lead is very resistant to corrosion against
a. Most acids * b. HCl -HNO_3 Mixture
c. Both (a) & (b) d. Neither (a) nor (b)

128. Lead is
a. Sweet in taste b. B.C.C. Crystal structure
c. Not poisionous d. Poisonous *

129. It has ------------------ resistance to deformation.
a. Low * b. High
c. Average d. None of the above.

130. Lead can easily be
a. Cast b. Welded
c. Soldered d. All of the above *

131. Lead is a -------------------- material.
a. Heavy weight * b. Light Weight
c. Weight less d. None of the above.

132. Lead Possesses
a. Low density b. High hardness
c. High density * d. None of the above.

133. Lead Possesses
a. Softness b. Malleability
c. Both (a) & (b) * d. Neither (a) nor (b)

134. Lead has high
a. Coefficient of expansion *
b. Hardness
c. Electrical conductivity
d. None of the above.

135. Lead has low
a. Coefficient of expansion
b. Softness.
c. Electrical conductivity *
d. All of the above.

136. Lead Alloy contain Pb upto
a. 8 to 10% b. 20 to 30%
c. 10 to 20% * d. 18 to 28%

137. Glass wool is used for
a. Tank lining b. Heat dissipation
c. Bearing purposes d. Heat insulation *

138. Lead commercially available in the form of
a. Sheet & foil * b. Bars
c. Ingots d. None of the above.

139. ------------------- refracts light strongly.
a. Ni Glass b. Lead Glass *
c. Neither (a) nor (b) d. both (a) & (b).

140. Bearing metals are lead and tin alloys for friction bearing, when antimony is added they are known as
a. Ceramic Metal
b. Bearing Metal
c. Babitt Metal *
d. Antimony bearing materials.

141. Lead-Tin alloy contains tin upto
a. 10 to 25% * b. 10 to 35%
c. 10 to 40% d. 10 to 15%

142. -------------------- is a hard lustrous white metal.
a. Cast Iron b. Nickel *
c. Cermets d. Copper

143. --------------------- has an atomic number of 28 & atomic weight of 58.71.
a. Aluminium b. Nickel *
c. Tin d. Antimony

144. Nickel has the melting point at
a. 1653°C b. 1439°C
c. 1353°C d. 1453°C *

145. The normal Crystallographic system of Nickel is ------------------ at al temperatures.
a. F.C.C * b. B.C.C
c. H.C.P d. None of the above.

146. Commercially pure nickel is ----------------- hard as low carbon steel.
a. More b. Less
c. Equally * d. None of the above.

147. ------------------ can take up high polish work
a. Nickel * b. Copper
c. Cast Iron d. Malleable Iron

148. -------------------- can be fabricated using processes similar for mild steel.
a. Nickel * b. Ceramics
c. Cast Iron d. None of the above.

149. -------------- is ferromagnetic at ordinary and low temperature but becomes paramagnetic at elevated temperatures.
a. Nickel * b. Aluminium
c. Copper d. Tungsten

150. Nickel possesses
a. Good corrosion resistance
b. Good oxidation resistance
c. Both (a) & (b) *
d. Neither (a) nor (b)

151. Invar is the trademark for an Iron -Nickel alloy containing ---------------------- Nickel.
a. 40 to 50% * b. 60 to 70%
c. 25 to 35% d. 30 to 35%

152. Invar has -------------------- coefficient of thermal expansion.
a. Very good b. No
c. Extremely high d. Extremely low *

153. Invar is used for making
a. Precision Instruments *
b. Heavy turbine casings
c. Both (a) & (b)
d. Neither (a) nor (b)

154. The major nickel based alloy with copper is 'Monel' which nominally contains Ni upto
a. 66% * b. 72%
c. 74% d. 69%

155. Monel has a ------------------ appearance than Nickel.
a. Darker b. Lighter
c. Brighter * d. None of the above.

156. Monel is ------------------ than Mild steel.
a. Softer & tougher b. Tougher & Brittle
c. Tougher & Harder * d. None of the above.

157. Monel has ------------------ resistance to atmospheric and sea water corrosion.
a. Poor b. Average
c. Excellent * d. None of the above.

158. The alloy which contain 45% Ni & 55% Cu is
a. DOW Metal b. Constantan *
c. Monel d. None of the above.

159. Constantan has
a. Highest electrical resistivity
b. Lower electrical resistivity
c. Higher thermal conductivity
d. Both as b. & c. *

160. Ni, Cu, Zn alloy known as
a. Nickel -Zinc Alloy b. Nickel Silver *
c. Nickel -Gold d. None of these

161. Tophet A is the alloy of
a. Cu-Al Alloy b. Cu -Zn Alloy
c. Ni - Cr Alloy * d. Ni-Al-Cu Alloy

162. Chromel is a
a. Ni-Cr Alloy * b. Ni -Sb Alloy
c. Ni -Al Alloy d. None of these.

163. Hastelloy A is a
a. Ni -Cr Alloy b. Ni -Al Alloy
c. Ni - Mo Alloy * d. Cu-Sb Alloy

164. Hastelloy D possess ------------------ resistance to Corrosion.
a. Poor b. Average
c. Very good * d. None of the above.

165. Tin is a ___________Metal
a. Non-Toxic white b. Non-Toxic-Soft
c. Both (a) & (b) * d. Neither (a) nor (b)

166. Zinc is a ------------------ Metallic element
a. Blue to gray * b. Grey to green
c. Yellow d. Metallic green

167. Zinc has relatively low melting point about
a. 320°C b. 419.5°C *
c. 348°C d. 519°C

168. Zinc possess ------------------ resistance to atmospheric corrosion
a. Average b. Poor
c. Good * d. None of the above.

169. Zinc possess solubility in
a. Silicon b. Tungsten
c. Copper (Brass) * d. None of the above

170. Zinc is commercially produced as
a. Slab b. Strip
c. Wire d. All of the above *

171. Zinc finds application as
a. Stampings b. Wire for Metallizing
c. Both (a) & (b) * d. Neither (a) nor (b)

172. --------------------- exerts an important hardening effect and raises the recrystallization temperature in Zinc base alloys
a. Cd * b. W
c. Cr d. None of the above.

173. Cu-Zn alloys are more
a. Ductile * b. Brittle
c. Difficult to roll d. None of the above.

174. Copper enters into solid solution in Zn upto approximatly
a. 1% * b. 2%
c. 3% d. 7%

175. In Zn base alloys, Mg when added in the presence of copper, increases resistance to
a. Scrap b. Cracking
c. Creep * d. All of the above.

176. Al-Zn alloys containing Al in uncontrolled compositions are unstable when
a. Rolled * b. Welded
c. Cast d. None of the above.

177. The most oftenly used process for casting Zinc alloys is
a. Investment casting b. Die casting *
c. Shell Moulding d. None of the above.

178. Zinc die castings range from a few gms to
a. 20kg * b. 29kg
c. 52kg d. 152kg

179. Zinc -base die casting alloys find application as
a. Software Items b. Hard-Disk
c. Both (a) & (b) d. Hardware Items *

180. Cobalt is a ----------------- metal.
a. Grey to Blue b. Yellow
c. Silvery -White * d. None of the above.

181. Below 421°C Cobalt microstructure is
a. FCC b. BCC
c. HCP * d. None of the above.

182. Above 421°C Cobalt microstructure is
a. FCC * b. BCC
c. HCP d. None of the above.

183. Cobalt alloys can be
a. Cast b. Welded
c. Swaged d. All of the above *

184. Cobalt reduces the ------------------- of steel, when dissolved in ferrite.
a. Permeability b. hardenability *
c. Weldability d. None of the above.

185. Cobalt alloys are
a. Low temperature alloy
b. High temperature alloy *
c. Depends on alloying element
d. Neither (a) nor (b)

186. Titanium is one of the few
a. Anotropic metals b. Isotropic metals
c. Allotropic metals * d. None of the above.

187. Titanium can exists in two different crystallographic form
a. True statement * b. False statement

188. Melting point of Titanium is
a. 1450°C b. 1539°C
c. 1680°C * d. 1453°C

189. At room temperature, Titanium has
a. Closed -Pack hexagonal structure *
b. Body cubic centroid structure
c. FCC Structure.
d. None of the above.

190. For Titanium, at around 885°C the alpha phase (H.C.P) transforms to a
a. BCC structure * b. FCC structure
c. Both (a) & (b) d. Remain same.

191. At 885°C for titanium the BCC structure is known as
a. Alfa phase b. Beta Phase *
c. Gamma phase d. None of the above.

192. In titanium HCP structure phase is known as
a. Gamma phase b. Alfa phase *
c. Beta phase d. None of the above.

193. Titanium are about ------------------- percent lighter than steel.
a. 80% b. 60%
c. 50% d. 40% *

194. Titanium are about ----------------------- heavier than Al.
a. 80% b. 60% *
c. 50% d. 40%

195. Titanium have ------------------- melting point than Iron.
a. Lower b. Higher *
c. Equal d. 100°C more

196. Titanium possess
a. Low thermal conductivity *
b. Average thermal conductivity
c. High thermal conductivity
d. None of the above.

197. Titanium possess ------------------- coefficient of thermal expansion.
a. Low * b. High
c. Average d. Equal to cast iron.

198. Electrical resistivity of titanium is
a. High * b. Low
c. Less than all metal
d. Highest in all non ferrous metals.

199. ------------------- process is relatively difficult because of Titanium's susceptibility to hydrogen, O_2 & N_2 impurities.
a. Fabrication *
b.Measuring of components
c. Both (a) & (b) d. Neither (a) nor (b)

200. Beryllium is ------------------- lighter than Aluminium.
a. $^1/_3$ * b. $^1/_9$
c. $^1/_4$ d. $^3/_4$

201. Beryllium possesses --------------- thermal conductivity.
a. Poor b. Average
c. Excellent * d. None of the above.

202. Beryllium is
a. Magnetic b. Non-magnetic *
c. Bad conductor of electricity
d. None of the above.

203. Beryllium is a ------------------ conductor of electricity.
a. Poor b. Bad
c. Good * d. None of the above.

204. Beryllium have
a. HCP structure * b. BCC structure
c. FCC structure d. None of the above.

205. For beryllium ductility improves considerably between
a. 100 to 700°C b. 100 to 300°C
c. 200 to 400°C * d. 500 to 700°C

206. Beryllium becomes brittle again
a. Above 500°C * b. Above 450°C
c. Above 400°C d. Above 329°C

207. The cost of beryllium metal is -----------------------
a. Low b. High
c. Average * d. Free of cost.

208. Because of the embrittlement problem, beryllium is most useful as a
a. Single constituent b. Composite constituent*
c. Both (a) and (b) d. Neither (a) nor (b)

209. Beryllium reinforced titanium -alloy composite have strengths of
a. 9860 Kg/cm² * b. 1296 Kg/cm²
c. 9240 Kg/cm² d. 8243 Kg/cm²

210. Titanium, was commercially available for the first time in
a. 1927 b. 1935
c. 1952 * d. 1967

CHAPTER - 19
MATERIALS FOR HIGH AND LOW TEMPERATURE SERVICE

1. Accelerated oxidation and corrosion resulting in loss of
   a. Strength * b. Weight (heavy amount)
   c. Electrical properties d. All of the above.

2. In the following, low temperature process is
   a. Preservation of vegetables
   b. Dewaxing of petroleum
   c. Synthetic rubber manufacture
   d. All of the above *

3. -------------------- is the study of the behaviour of matter at temperature below -200^{o}C.
   a. Thermodynamics b. Avionics
   c. Cryogenics * d. None of the above.

4. The carbon steels temper readily and have ------------ creep resistance above about 315^{o}C.
   a. Poor * b. Bad
   c. Average d. None of the above.

5. The medium alloy and hot work tool steels resist tempering upto a temperature of about
   a. 248^{o}C b. 728^{o}C
   c. 540^{o}C * d. 740^{o}C

6. Molybdenum is used in Iron base alloy for improving ------------------ upto about 425^{o}C.
   a. Cracking b. Season cracking
   c. Creep resistance * d. None of the above.

7. The nickel-chromium series of high -Nickel alloy is__________ resistant to corrosion at elevated temperature.
   a. Lowest b. Highly *
   c. Average d. None of the above.

8. The Nickel-chromium series of high Nickel alloys has excellent
   a. Thermal shock resistance *
   b. Cracking phenomenon
   c. Carburizing phenomenon
   d. None of the above.

9. Nickel-chromium-Molybdenum alloys have good high temperature.
   a. Strength b. Ductility
   c. Both (a) & (b) * d. Neither (a) nor (b)

10. Cobalt base alloys possess ----------------------- high temperature strength characteristic.
    a. Poor b. Average
    c. Excellent * d. None of the above.

11. Melting point of cobalt is
    a. 1495^{o}C * b. 1395^{o}C
    c. 1295^{o}C d. 1195^{o}C

12. Recrystallization temperature of cobalt is approximately
    a. 935^{o}C b. 835^{o}C
    c. 735^{o}C d. 435^{o}C *

13. Ductile molybdenum is a development, made possible by the
    a. Arc cast process *
    b. Die cast process
    c. Investment Cast process
    d. All of the above.

14. Melting temperature of chromium is
    a. 1788^{o}C b. 1888^{o}C *
    c. 1988^{o}C d. 1432^{o}C

15. Melting temperature of Molybdenum is
    a. 2027^{o}C b. 1732^{o}C
    c. 2727^{o}C * d. 3232^{o}C

16. Melting temperature of Tungsten is
    a. 3010^{o}C b. 2910^{o}C
    c. 3310^{o}C d. 3410^{o}C *

17. Ceramic possesses very
    a. Low thermal conductivity *
    b. High thermal conductivity
    c. High thermal shock resistance
    d. None of the above.

18. Ceramic possesses
    a. Poor thermal shock resistance
    b. Mechanical shock resistance
    c. Both (a) & (b) *
    d. Neither (a) nor (b)

19. Ceremets has been developed by
    a. Powder metallurgical method *
    b. Foundry.
    c. Casting.
    d. None of the above.

20. Ceremets possesses
    a. Low ductility *
    b. High ductility
    c. High strength
    d. All of the above

■■■

CHAPTER - 20
ALLOY STEEL ELEMENTS, SPECIAL QUALITIES AND USAGES

1. If nickel is added 3 to 5 % in steel, it induces
   a. Greater strength
   b. Toughness
   c. Resistance to fatigue
   d. All above *

2. To manufacture scientific instruments the 'INVAR' steel is used which contains nickel contents at
   a. 15%
   b. 20%
   c. 30%
   d. ≈36% *

3. The steel with 3% of chromium is used to make
   a. Gears
   b. Crankshaft
   c. Ball and roller bearings *
   d. Parts exposed to corrosion

4. Tungsten between 9 -17 % in steel induces
   a. Toughness at high temperatures
   b. Hardness at high temperatures *
   c. Brittleness at high temperature
   d. Ductility at low temperatures

5. If a steel contains 2-4% of molybdenum, the steel will be
   a. Soft at high temperatures
   b. Harder at high temperatures *
   c. Ductile at low temperatures
   d. None of the above

6. Permanent magnets are made from steels which contains high percentage of
   a. Chromium
   b. Tungsten
   c. Cobalt *
   d. Molybdenum

7. Manganese if added in steel up to 1.5%, it.
   a. Induces finer structure after heat treatment
   b. Makes steel for welding and reduces the effect of impurities
   c. a. and b. are correct *
   d. All above are wrong

8. Vanadium, if introduced in steel even as low as 0.25 % provides
   a. Greater strength
   b. Greater resistance to fatigue
   c. Springs quality
   d. All above *

9. Manganese if added to steel in 10 -15 % strength, the steel becomes :
   a. Brittle
   b. Difficult to work
   c. None magnetic
   d. b. and c. are correct *

■■■

CHAPTER - 21
NON - FERROUS METALS (PROPERTIES & USES)

1. Aircraft fairings, fuel tanks and unstressed structures are made from
   a. Aluminium * b. Cadmium
   c. Magnesium d. Chromium

2. Since cadmium is a corrosion resistance metal is used for
   a. Anticorrosive plating b. Fusible alloys
   c. Bearing metals d. All above *

3. The chromium have the properties of
   a. Hardness b. Brittleness
   c. Corrosion resistance d. All above *

4. Copper is a tough, ductile, malleable, high thermal and electrical conductor, hence it is used for
   a. Tubing, rivets and electrical conductors
   b. Extensively in light alloy
   c. Nails, gauge and bearing alloy
   d. All above *

5. Lead is a soft, malleable and an acid resistant, hence, it is used :
   a. In lead acid batteries
   b. Cable sheathing and protective linings
   c. Ballast and alloyed with tin and bearing alloys
   d. All above *

6. The properties of magnesium are
   a. Soft, poor resistance to corrosion
   b. Brittle
   c. Lighter than aluminium
   d. All above *

7. Nickel is a :
   a. Hard and ductile
   b. Corrosion and temperature resistant
   c. Brittle
   d. a. and b. correct *

8. Zinc
   a. Is a soft, ductile and malleable
   b. Is used for anticorrosive plating
   c. Is the constituent of brass and other alloys
   d. For zinc all above are correct *

9. The important constituent of solder is
   a. Copper b. Lead
   c. Tin * d. Zink

10. Manganese is a
    a. Hard and brittle * b. Soft and ductile
    c. Tough and malleable d. None of the above

■■■

CHAPTER - 22
CERTIFICATION OF AEROSPACE MATERIALS

1. Current aeronautical material prove
   a. environmental capabilities
   b. higher resistance to low cycle fatique
   c. greater fracture toughness
   d. all of the above *

2. Which of the following are the aerospace material specification
   a. AMS in US
   b. BS : L , T , S , HR in UK
   c. AIR in france
   d. all of the above *

3. Adequate precautions were taken to ensure that an aircraft structure posses
   a. sufficient strength to withstand the most severe expected gust
   b. manoeuver loads
   c. both a. or b. *
   d. none of the above

4. Mild steel curve is known as
   a. S - N curve *
   b. S - P curve
   c. D - E curve
   d. N - M curve

5. Material has an actual infinite life stress
   a. duration limit
   b. endurance limit *
   c. both a. & b.
   d. none of the above

6. In engineering design 90% failure have been due to
   a. fatique *
   b. shear
   c. stress
   d. strain

7. The concept in which critical components were expected to operate safely to a given no. of hours
   a. infinite safe design
   b. fail safe design
   c. safe-life design *
   d. all of the above

8. A structure in which there is sufficient tolerance of a failure which has gone undetected to permit contineous service
   a. infinite design
   b. safe life design
   c. fail safe design *
   d. all of the above

9. Majority of airframe now a days are designed predominantly
   a. fail safe *
   b. infinite design
   c. both a. & b.
   d. none of the above

10. Which of the following are secondary fabricaion process
    a. forming b. joining *
    c. thermal processing d. all of the above

11. The design has to take congnizance of
    a. effect of fabrication variables
    b. wide range of environment operation
    c. effect of low level flying to avoid radardetection
    d. all of the above *

12. Standing on ground in adverse condition the skin temperature approaches to about
    a. 80^0F
    b. 80^0C *
    c. 90^0F
    d. 90^0C

13. Expected service life of both military & civil aircraft are
    a. 15 - 20 years *
    b. 10 - 15 years
    c. 5 - 10 years
    d. 20 - 25 years

14. What are the material properties to be concerned
    a. quantitiable properties
    b. desirable but difficult to measure properties
    c. desirable but unquantifiable properties *
    d. all of the above

15. An aeroengine is expected to develope
    a. 30 to 40 hp b. 40 to 50 hp
    c. 50 to 60 hp * d. all of the above

16. Primary requirement of aircraft
    a. very high power density
    b. lower weight
    c. both a. & b. *
    d. none of the above

17. A part shall be graded as 'A' if the deformation or failure of the part would be
    a. structural collapse
    b. loss of control
    c. failure of motive power
    d. all of the above *

18. Inability to operate or unintentional operation of any system or equipment essential to the safety or operational function of the aeroplane coming under
    a. graded A * b. graded B
    c. graded C d. graded D

19. Grade A part is defined as
    a. injury to personnel
    b. seriousdamage to the parent A/C
    c. loss of guided missile
    d. all of the above *

20. The operating environment of turbine is
    a. high temperature *
    b. high volume
    c. low pressure
    d. all of the above

21. The operating environment of compressor is
    a. high temperature
    b. high volume *
    c. low pressure
    d. all of the above

22. Rim operates at the highest temperature
    a. with relatively high stress
    b. with relatively low stress *
    c. both a. & b.
    d. none of the above

23. Overspeed capacity occurs
    a. shaft failure *
    b. disk failure
    c. turbine failure
    d. all of the above

24. Fatique strength depends upon
    a. microstructure
    b. grain structure
    c. both a. & b. *
    d. none of the above

25. Materials used for developing turbine is
    a. nickel base alloy *
    b. iron base alloy
    c. both
    d. none of the above

26. The last stage of H.P. compressor is made up of
    a. Al alloy
    b. titanium alloy *
    c. both
    d. none of the above

27. Evaluation requirement of aeroengine dise mostly depends on
    a. compatibility of material used
    b. limited to the type of stresses
    c. environment to face in actual service
    d. all of the above *

28. The highest temperature is in
    a. outer rim *
    b. inner rim
    c. middle rim
    d. all of the above

29. The whole componentcan be maped
    a. plane & peak stresses
    b. temperature stress
    c. temperature qradient
    d. all of the above *

30. Repeat cut-up testing throughout production
    a. evaluate process consistency *
    b. strength
    c. both
    d. none of the above

31. Release of forging during series of production to include room and elevated temperature
    a. notch tensile
    b. creep
    c. rupture
    d. all of the above *

32. Disc forging by experienceddisc forger with known material are re-evaluated where either of the following occur after approval
    a. a change in material manufacture
    b. a significant change in melting point
    c. a change in forger
    d. all of the above *

33. A significant break in production is
    a. 2 years or more *
    b. 3 years or more
    c. 4 years or more
    d. 5 years or more

34. Cut up testing is less extensive than
    a. approval of a new forguer and/or of a new material*
    b. significant change in forging
    c. both a. & b.
    d. none of the above

35. Full finished blade is tested for
    a. fatique * b. stress
    c. cracks d. tension

36. Thermal fatique is conducted
    a. forging stock
    b. finished blade
    c. both a. & b. *
    d. none of the above

37. Final clearance only given after satisfactory performance of the products of
    a. five heats * b. four heats
    c. two heats d. one heats

38. For final clearance for class-B components
    a. two to three melts *
    b. one to two melts
    c. four to five melts
    d. all of the above

39. Mark the correct statement
    a. The basic mechanical properties not only exceed material & process specification minima but do so in a consistent manner
    b. all components of a given type will respond to service imposed stress and environments in similar fashion
    c. both a. & b. *
    d. both are wrong

40. Characteristics of low Al. steel
    a. narrower range of alloying element
    b. significant reduction in impurity element
    c. better 0.2% PS
    d. all of the above *

41. Regarding maraging steel
    a. trace elements Ca, Cn & Cr are controlled better
    b. metallographic standards are stringent
    c. control of various inclusion counts has been specified
    d. all of the above

42. Aluminium alloy have
    a. narrow range
    b. impurity controlled more closely
    c. both a. & b.*
    d. none

43. In superalloy
    a. carbon range in specified for better property control
    b. impurity elements are controlled better both in numbers & amount
    c. both a. & b. *
    d. none

44. In titanium alloy
    a. impurity element are controlled
    b. mechanical properties are significantly superior
    c. both a. & b. *
    d. none

45. Aerospace material have
    a. tighter range of alloying element
    b. better control of larger number
    c. lower acceptance limits
    d. all of the above *

46. Property of aerospace material are the
    a. lower acceptance limit of injurious element
    b. stringent metallogouphic acceptance norms
    c. both a. & b. *
    d. none of the above

47. Aerospace material have
    a. higher mechanical property limit
    b. stringent metalogric acceptance norms
    c. closer dimensional tolerances
    d. all of the above *

48. Which of the following material generally used in A/C construction
    a. aluminium alloy
    b. titanium alloy
    c. super alloy
    d. all of the above *

49. The team spends sufficient time investigating in depth the facilities that exist with main emphasis on
    a. production facilities
    b. performance of equipments
    c. system monitoring operation
    d. all of the above *

50. Extremely remote not expected to occur more than
    a. 10^{-7} per hour of flight *
    b. 10^{-6} per hour of flight
    c. 10^{-5} per hour of flight
    d. all of the above

■■■

CHAPTER - 23
SUPER ALLOYS

1. The main alloying element imparting solid solution strength in these alloys are
   a. chromium
   b. molybdenum
   c. both a. & b. *
   d. none of the above

2. Ni-fe alloys are mostly have been used in the
   a. annealed *
   b. hardening
   c. both a. & b.
   d. none of the above

3. Annealing treatment is based on
   a. property requirements *
   b. necessity
   c. both a. & b.
   d. none of the above is correct

4. For producing highest tensile and fatigue strengths the annealing temperature requirements
   a. 870^0 to 980^0 C *
   b. 600^0 to 700^0F
   c. 600^0 to 1000^0C
   d. 240^0 to 356^0 C

5. High temperature annealing about 1120 to 1200^0 C produces
   a. optemum fatique resistance
   b. creep rupture properties at service temperature <600^0 C
   c. both a. & b. *
   d. none of the above is correct

6. Solid nickle base alloys are used for aerospace application are
   a. inco 601
   b. inco 617
   c. inco 625
   d. all of the above *

7. Nimonic 75 is used in
   a. aerospace application *
   b. domestic application
   c. both a. & b.
   d. none of the above is correct

8. Application of inco 601, 617 and nimonic are
   a. combustion can liners
   b. diffusers
   c. heat shields
   d. all of the above *

9. For thrust reverser which of the super alloy is used
   a. nickel base alloy *
   b. gold base alloy
   c. aluminium base alloy
   d. none of these is correct

10. For turbine shroud ring which of the super alloy is used
    a. aluminium base alloy
    b. nickel base alloy *
    c. iron base alloy
    d. all of the above

11. For hydraulic lines which of the super alloy is used
    a. chromium base alloy
    b. magnesium base alloy
    c. nickel base alloy *
    d. all of the above is correct

12. Application of nickel base alloys are
    a. spray bars
    b. exhaust system
    c. ducting system
    d. all of the above *

13. Application of nickel base alloys are
    a. heat shields
    b. diffuser
    c. fuel lines
    d. all of the above *

14. Application of nimonic are
    a. exhaust system *
    b. spray bar
    c. both a. & b.
    d. none of the above is correct

15. For increasing mechanical properties in nickel base alloy
    a. solution heat treatment is required
    b. precipitation heat treatment is required
    c. both a. & b. *
    d. none of the above

16. Nickel base alloys contain
    a. aluminium b. titanium
    c. niotrium d. all of the above *

17. Niotrium have significantly better
    a. weldability
    b. heat of welding does not include hardening
    c. and consequent post-weld cracking
    d. all of the above *

18. Nickel base alloys have their operating capabilities extend upto
    a. 90% to 95% *
    b. 70% to 80%
    c. 60% to 70%
    d. 30% to 40%

19. Ni-base alloys are expected to continue domination even for advanced gas turbine application and act as the sole dictator since their
    a. operating capabilities extend upto 90% to 95%
    b. rapid development of sophisticated air cooling
    c. proven production capabilities
    d. all of the above *

20. Among threee super alloys which of the following super alloy is superior
    a. nickel base alloy *
    b. iron base alloy
    c. cobalt base alloy
    d. all of the above

21. In aerospace application most of the material is constructed in
    a. iron base alloy
    b. nickel base alloy *
    c. both a. & b.
    d. none of the above is correct

22. Aircraft engines beyond compressors are mostly constructed with
    a. iron base alloy
    b. ni-base alloy *
    c. both a. & b.
    d. none of the above

23. Compressors constructed in ni-base super alloy
    a. with increase in air pressure *
    b. with increase in water pressure
    c. both a. & b.
    d. none of the above

24. Which of the following nickel alloy is used to construct combustion chamber
    a. N-75 *
    b. N-20
    c. N-40
    d. N-45

25. Which of the following nickel alloy is used to construct bolts
    a. N-35
    b. P-25
    c. M-30
    d. N-75 *

26. Alloy N-75 is used to construct
    a. combustion chamber
    b. environmental control system parts like flange
    c. bolts
    d. all of the above *

27. Heat treating & chemical processing equipments are made of
    a. inconel-600 *
    b. inconel-400
    c. inconel-300
    d. all of the above

28. Corrosion resistance parts are made of
    a. haste alloy C-276 *
    b. haste alloy C-356
    c. C-276
    d. haste alloy C-554

29. Turbine engine components and jet pipes are constructed from
    a. nimonic - 80 A *
    b. nimonic - 70A
    c. nimonic - 75A
    d. nimonic - 35A

30. Turbine blades are constructed from
    a. nimonic - 100 *
    b. nimonic - 105
    c. nimonic - 95
    d. nimonic - 35

31. Turbine disc are constructed from
    a. nimonic - 95
    b. nimonic - 105 *
    c. nimonic - 95
    d. all of the above

32. Combustion chambers are constructed from
    a. nimonic - 263 *
    b. nimonic - 164
    c. nimonic - 236
    d. none of the above

33. Jet engine blades are constructed from
    a. rene - 41 *
    b. rene - 42
    c. rene - 48
    d. rene - 49

34. Jet engine pipes are constructed from
    a. rene - 98
    b. rene - 100 *
    c. rene - 102
    d. rene - 104

35. Jet engine blades are made up of
    a. wasp alloy
    b. rene - 41
    c. nimonic - 263
    d. all of the above are correct *

36. Ni-base alloys are
    a. rene - 41
    b. nimonic - 90 A
    c. rene - 100
    d. all of the above are correct *

37. Ni-base alloys are
 a. haste alloy C-276
 b. haste alloy
 c. rene-41
 d. all of the above *

38. Uses of Ni-base alloys are
 a. flange
 b. bolts
 c. blades
 d. all of the above *

39. Uses of Ni-base alloys are
 a. combustion chamber
 b. adoptor deflector
 c. jet engine blades
 d. all of the above *

40. Chromium is generally added in nickel base alloys for
 a. increasing corrosion resistance *
 b. chromium halides are formed
 c. both a. & b.
 d. none of the above are correct

41. Chromium is added in nickel base alloys which
 a. 789decreasies corrosion resistance
 b. forms chromium carbides
 c. both a. & b. *
 d. none of the above

42. Nickel base alloys are
 a. complex composition *
 b. simple composition
 c. both a. & b.
 d. none of the above

43. Oxidation resistance is obtained in nickel base alloy by
 a. addition of iron
 b. addition of chromium *
 c. both a. & b.
 d. none of the above

44. If iron is added in Ni-base alloy it results is;
 a. decrease in oxidation *
 b. increase in oxidation
 c. no effect on oxidation
 d. none of the above

45. If iron is added in Ni-base alloy then it;
 a. increases malleability *
 b. decreases malleability
 c. is hard in nature
 d. none of the above

46. To improve grain boundary in nickel base alloy
 a. addition of halnium *
 b. addition of iron
 c. both a. & b.
 d. none of the above

47. Hf addition in Ni-base alloy increases
 a. oxidation resistance
 b. inhibit rapid crack propagation
 c. both a. & b. *
 d. none of the above

48. To improve interfacial energy relationships at grain boundaries should be added
 a. boron b. zirconium
 c. both * d. none

49. If boron is added in Ni-base alloy it improves
 a. hardness b. brittleness
 c. both * d. none

50. To increase brittleness of Ni-base alloy addition is required of
 a. boron * b. carbon
 c. iron d. all of the above

51. What is the advantage of nickel base alloy for turbine blades
 a. creep resistance * b. vibration resistance
 c. temperature resistance d. none of the above

52. Nimonic 75 is
 a. 0.43% Ti & 0.2% C to nichrome
 b. 0.3% Ti & 0.1% C to nicrome *
 c. 0.5% Ti & 0.8% C
 d. 0.3% Ti & 9.0% C to nicrome

53. Most alloys are used upto which temperature
 a. 70% of their melting point
 b. 60% of their boiling point
 c. 80% of their melting point *
 d. 90% of their working temperature

54. What are the property required for aeronautical industry
 a. high creep & stress rupture strengths at elevated temperature
 b. high tensile & proof strengths at operating temperature
 c. high oxidation and hot corrosion resistance
 d. all of the above *

55. The property of requirements of aeronautical industry are
 a. high oxidation and hot corrosion resistance
 b. microstructural stability
 c. resistance to crack propagation
 d. all of the above *

56. Mark the correct statement regarding aeronautical product
 a. high creep & stress rupture strengths at elevated temperature
 b. high tensile & proof strengths at operating temperature
 c. resistance to crack propagation
 d. all of the above *

57. Super alloys are based on
    a. iron b. nickel
    c. cobalt d. all of the above *

58. Super alloys are developed for the temperature
    a. more than 550^0 C *
    b. less than 550^0 C
    c. equal to 550^0 C
    d. less than 500^0 C

59. Super alloys are used where
    a. severe mechanical stressing is required
    b. surface stability is more often required
    c. both a. & b. *
    d. none of the above

60. Super alloys show resistance to
    a. oxidation b. hot corrosion
    c. erosion d. all of the above *

61. Which statement is true regarding super alloys
    a. are not resistance to oxidation
    b. resistance to hot corrosion *
    c. not resistance to erosion
    d. all of the above

62. Ti is added in super alloy for
    a. obtaining elevated temperature
    b. grain boundary strengtheners *
    c. improve castability
    d. none of the above

63. Grain boundary strengtheners what is the material in super alloy
    a. Al * b. C
    c. B d. all of the above

64. For elevated temperature which element is used in super alloy
    a. Zr * b. Al
    c. Nb d. Mo

65. Mark the correct statement
    a. allowing addition for solution strengthening by addition of low amount of Cr, W, Mo, Ta & for precipitation characteristics by addition of Y' and/or Y" former
    b. Ti, Al & Nb minute quantities of grain boundary strength
    c. C, B, Zr are also added for elevated temperature properties
    d. all of the above *

66. Super alloys are distributed into
    a. one category b. two class
    c. three classes * d. four class

67. Super alloys are divided into
    a. nickel base alloy b. cobalt base alloy
    c. iron base alloy d. all of the above

68. High temperature strength of the iron-base alloys are lower at temperature above
    a. 650^0 C * b. 750^0 C
    c. 550^0 C d. 450^0 C

69. The temperature exposure of these alloys causes
    a. coalescence * b. fene
    c. coarse d. all of the above

70. Effects of aluminium in iron-base super alloy
    a. retards formation of hexagonal Ni_3Ti *
    b. MC carbides
    c. stabilises fee matrix
    d. all of the above

71. Effects of titanium alloying element in iron-base super alloy
    a. formation of hexagonal
    b. forms γ' $Ni_3(Al,Ti)$ and MC carbides *
    c. enhances oxidation resistance
    d. improve creep properties

72. Effects of Niotrium & Tantalum in iron-base super alloy
    a. formation of hexagonal
    b. forms body centered tetragonal γ'' and MC carbides *
    c. stabilises fee matrix
    d. all of the above

73. Effects of carbon element in iron-base super alloy
    a. MC carbides
    b. as in (a) and M_7C_3, $M_{23}C_6$ and M_6C carbides
    c. as in (b) and stabilizes fee matrix *
    d. none of the above

74. Effects of phosphorous element in iron-base super alloy
    a. promotes general precipitation of carbides *
    b. forms MC carbides
    c. both a. & b.
    d. none of the above

75. Effects of nitrogen in iron-base super alloy
    a. forms body centered tetragonal
    b. forms M(C,N) carbonitrides
    c. both a. & b. *
    d. none of the above

76. Effects of chromium in iron-base super alloy
    a. oxidation resistance
    b. solid solution strengthening
    c. a. and b. are correct *
    d. none of the above

77. Effects of molybedenum & tungsten in iron-base super alloy
    a. retrads formation of hexagonal
    b. solid solution strengthening
    c. forms M_6C carbides
    d. both b. and c. *

78. Effects of boron in iron-base super alloy
   a. improve creep resistance properties
   b. retard formation of grain boundary
   c. both a. and b. *
   d. none of the above

79. Effects of zirconium in super alloy
   a. improve creep properties
   b. retard formation of grain boundary
   c. both a. and b. *
   d. none of the above

80. Effects of lanthanum in super alloy
   a. enhances oxidation resistance *
   b. improve creep resistance
   c. oxidation resistance
   d. all of the above

81. Cobalt base super alloys get their strength mostly by
   a. solution strengtheners
   b. precipitation of carbide phases
   c. both a. & b. *
   d. none of the above

82. For carbide formation in cobalt base alloy it is required to have
   a. 0.4 to 0.85% carbon *
   b. 0.2 to 0.25% carbon
   c. 0.2 to 0.5% carbon
   d. 0.6 to 0.75% carbon

83. Cast alloys are denoted by
   a. X-20 *
   b. Y-20
   c. C-20
   d. Fe-20

84. Wrought alloys are denoted by
   a. haynes - 65
   b. haynes - 25 *
   c. haynes - 30
   d. haynes - 45

85. Cobalt solid solution can be sub divided into
   a. two groups
   b. four groups
   c. three groups *
   d. none of the above

86. Subdivided groups of cobalt solid solution alloy
   a. for primary use 650 to 1150^0 C
   b. faster alloys for use upto 650^0
   c. wear resistance alloys
   d. all of the above *

87. Cobalt base super alloy for use in primary form
   a. 650 to 1150^0 C Hynes - 25
   b. haynes 188
   c. UMCO - 50
   d. all of the above *

88. Cobalt base super alloy for use upto 650^0 C
   a. MP-35 N
   b. MP-159
   c. both a. & b. *
   d. none of the above

89. Cobalt base alloys have wear resistance have
   a. stellite B *
   b. stellite A
   c. Stellite C
   d. Stellite D

90. Cobalt base alloys are complete solid solution alloy
   a. all contains primary carbide stage
   b. all contain secondary carbide stage *
   c. both a. & b.
   d. none of the above

91. Cobalt base alloys are
   a. truly stable when heated *
   b. truly unstable when cooled
   c. truly stable & unstable when unheated
   d. none of the above when heated

92. Which of the following super alloy is used in the hottest part
   a. cobalt base alloy
   b. iron base alloy
   c. nickel base alloy *
   d. all of the above

93. Use of X-40 (cobalt base alloy)
   a. gas turbine parts, nozzle vane partitions *
   b. fixtures
   c. hot sections
   d. all of the above

94. For preparing gas turbine hot sections, nuclear reactor components
   a. X-40
   b. haynes 25 *
   c. haynes 188
   d. S-816

95. Cobalt base alloys are
   a. X-40
   b. haynes 188
   c. UMCO-50
   d. all of the above *

96. For preparing combustors, transition ducts which of the following cobalt base alloy is used
   a. haynes 25 b. haynes 188 *
   c. 3 - 816 d. all of the above

97. For preparing fasteners which of the following cobalt base alloy is used
   a. MP-35 N * b. MP-159
   c. both a. & b. d. none of the above

98. For hot section parts in G.T. engine which of the following alloy of cobalt base is required
a. stellite 6B * b. stellite 7B
c. stellite 4B d. stellite 3B

99. Use of cobalt base alloy are
a. nozzle vanes b. combustors
c. furnance d. all of the above *

100. Use of cobalt base alloys are
a. fasteners b. fixtures
c. erosion resistance d. all of the above *

101. Addition of vanadium is super alloys improves
a. ductility * b. malleable
c. tensile strength d. all of the above

102. Manganese & silicon are added in super alloy as a
a. deoxidisors * b. insulator
c. both a. & b. d. none of the above

103. Which of the element helps to grain size refinment
a. iron b. steel
c. carbon * d. all of the above

104. During hot working and heat treating which of the following element helps in grain size refinment
a. magnesium b. manganise
c. carbon * d. all of the above

105. In Ni-fe alloys which element is added to improve ductility
a. magnesium b. calcium
c. neodymium d. all of the above *

106. Most of strace element decorate the grain boundaries with high local concentrations alloys can be determined by
a. microprobe b. auger spectroscopic
c. both a. & b.* d. none of the above

107. Presence of Bismuth in nickel base alloy reduces
a. rupture life * b. fracture life
c. tensile strength d. vibration

108. Addition of Bismuth in Ni-base alloy reduces the rupture how many times of base alloy
a. 4 times b. 5 times
c. 6 times * d. 7 times

109. The trace element problem encountered by american industany was resolved by
a. AMS 2280 * b. AAS 2280
c. ALM 2280 d. ACB 2280

110. AMS stands for
a. all metallic structure
b. aerospace material specification *
c. aircraft material specification
d. aviation material structure

111. Solubility and can be used as major alloying addition of > 0.5 wt% such as
a. Be
b. Al
c. V
d. all of the above *

112. Relatively neutral in small amounts but harmful in larger addition < 0.5 wt%
a. C
b. O
c. both a. & b. *
d. none of the above

113. Trace element classification is according to
a. brieber
b. deeker
c. both a. & b. *
d. none of the above

114. Immiscrible or volatile in the liquid state at atmospheric pressure and do not alloy with nickel such as
a. Na
b. K
c. Rb
d. all of the above *

115. Beneficial in small amounts, harmful in larger addition in super alloy such as
a. Ba
b. B
c. Zr
d. all of the above *

116. Classification of impurities and trace element in nickel base alloys are according to
a. Holt
b. Wallace
c. both a. & b.*
d. none of the above

117. Impurities of rasidual gases are in Ni-base alloys
a. oxygen
b. hydrogen
c. nitrogen
d. all of the above *

118. Non-metallic impurities in Ni-base alloys are
a. Pb
b. Bi
c. Sb
d. all of the above are wrong *

119. Metallic/metalloid impurities are in Ni-base super alloy are
a. Pb
b. Bi
c. Sb
d. all of the above *

120. Non-mettalic impurities in Ni-base alloys are
a. S
b. P
c. both a. & b. *
d. none of the above

121. Cu, Ti & Te are coming under
a. metallic metalloid impurities *
b. residual gases
c. non-metallic impuries
d. refining aids

122. S & P are coming under
a. refining aids
b. non-metallic impurities *
c. both a. & b.
d. none of the above

123. O, H, N & Ar coming under in Ni-base alloy
a. residual gases *
b. non-metallic impurities
c. both a. & b.
d. refining aids

124. Ca, Mg are coming under
a. non-metallic impurities
b. refining aids *
c. minor & PPM alloying additions
d. all of the above

125. Minor & PPM alloying additions, alloying addition upto 1.5 wt%
a. Zr
b. Mg
c. Ce
d. all of the above *

126. While preparing crystal alloy which of the following element is not used
a. boron
b. carbon
c. hatnium *
d. all of the above

127. Hatnium is not used in preparing
a. crystal alloy *
b. oxide
c. monoxide
d. all of the above

128. Elements like chromium, tantalium are released to increase its
a. strength * b. capacity
c. manufacturing d. all of the above

129. Further improvement in cast single-crystal alloys can be expected from the judicions addition of
a. iron b. cobalt
c. rhenium * d. gold

130. For improving oxidation resistance in Ni-base alloy addition requred of
a. hatnium b. yttrium
c. both a. & b. * d. none of the above

131. Rhenium is beneficial for in Ni-base alloy
a. rupture b. fracture
c. both a. & b. * d. compression

132. For obtaining remarkable oxidation resistance in nickel base alloy
a. Y hrium b. lanthanum
c. both a. & b. * d. none of the above

133. Cobalt base super alloys depend primary on
a. solid solution
b. inter reaction between hard carbides
c. alloy imperfections
d. all of the above *

134. High iron-nickel alloys are diluted with
a. iron * b. nickel
c. both a. & b. d. cobalt

135. FCC nickel base austenite phase usually contains
a. cobalt b. chromium
c. molybdenum d. all of the above *

136. Some of the gamma matrix alloys retain their useful strength
a. 0.9 Tm * b. 0.7 Tm
c. 0.6 Tm d. 0.5 Tm

137. Some of the gamma matrix alloys used for times upto
a. 10,00,000 hrs b. 1,00,000 hrs *
c. 10,000 hrs d. none of the above

138. Nickels alloys have
a. high tolerance for alloying without phase instability *
b. tendency to form ironoxide
c. both a. & b. are wrong
d. all of the correct

139. Nickel alloys have tendency from Al_2O_3 which is
a. resistance to vibration
b. resistance to oxidation *
c. resistance to fracture
d. resistance to rapture

140. Molybdenum substitutes for
a. nickel
b. iron
c. both of the above *
d. none of the above

141. Chromium substitutes for
a. nickel *
b. gold
c. silver
d. tin

142. Cobalt can also substitute for nickel to certain extent to
   a. reduce temperature *
   b. reduce pressure
   c. reduce volume
   d. reduce pressure

143. Requirements of carbides in nickel base alloys are
   a. from along grain boundrais *
   b. reduce vibrations
   c. reduce tensile strength
   d. reduce compressive strength

144. Carbides influences in Ni-base alloys are
   a. chemical instability to material
   b. chemical stability to matrix *
   c. both a. & b. are wrong
   d. both a. & b. are correct

145. The common carbides are found in super alloys are
   a. MC
   b. $M_{23}C_6$
   c. M_6C
   d. all of the above *

146. The coherency strains also account for rapid loss of stability in excess of
   a. 600^0C
   b. $650^0 C$ *
   c. $300^0 C$
   d. $400^0 C$

147. The preferred order for formation of carbides is in order of decreasing stability
   a. Hfc, Tal, Cbc & Tic *
   b. Tal, Cbc, Tic, Hfc
   c. Cbc, Tic, Hfc, Tic
   d. none of the above

148. Addition of Cb, Ta tends to counteract the degeneration of MC carbides even at sol treatment temperature of order
   a. $1200\text{-}1400^0 C$ b. $1200\text{-}1260^0 C$ *
   c. $1200\text{-}1300^0 C$ d. $1100\text{-}1230^0 C$

149. The composition of Mar-M 200
   a. $Ti_{0.53}$ b. $Cb_{0.31}$
   c. $W_{0.16}$ d. all of the above *

150. $M_{23}C_6$ carbides have
   a. high Cr content *
   b. low Cr content
   c. both a. & b. are wrong
   d. iron containt

151. $M_{23}C_6$ has a
   a. complex cone shape
   b. complex cubic shape *
   c. complex diamond shape
   d. as a straight line

152. M_6C carbides forms at
   a. $815\text{-}980^0 C$ *
   b. $800\text{-}900^0 C$
   c. $750\text{-}800^0 C$
   d. $600\text{-}900^0 C$

153. M_6C carbides are stable at higher temperature than
   a. M_2C
   b. M_3C
   c. M_6C *
   d. M_5C

154. Formation of $M_{23}C_6$ type carbides at grain boundaries improves resistance to :
   a. rupture *
   b. fracture
   c. friction
   d. ductility

155. M_6C carbides have been observed to have formulated ranging from
   a. M_2C to M_4C
   b. M_3C to $M_{13}C$ *
   c. M_4C to M_8C
   d. $M_{13}C$ to $M_{23}C$

156. Boron an essential ingredient is present to the extent of
   a. 500-5000 PPM in super alloy
   b. 500-1000 PPM in super alloy
   c. 500-700 PPM in super alloy
   d. 50-500 PPM in super alloy *

157. Boron forms in super alloy
   a. borides at grain boundaries *
   b. boron oxide
   c. both a. & b.
   d. all are wrong

158. During heat treatment primarily carbide MC decomposes
   a. speedly
   b. slowly *
   c. rapidly
   d. none of the above

159. Which of the following reaction is correct
   a. $MC + \gamma \rightarrow M_{23}C_6 + \gamma'$ *
   b. $M_2C + \gamma \rightarrow M_{23}C_6 + \rightarrow \gamma'$
   c. $M_3C_2 + \gamma \rightarrow M_{23}C_6 + \rightarrow \gamma'$
   d. $M_{23}C_6 + \gamma \rightarrow M_{23}C_6 + \rightarrow \gamma'$

160. Formation of M_6C can be formed by
   a. $M_2C + \gamma \rightarrow M_6C + \rightarrow \gamma'$
   b. $MC + \gamma \rightarrow M_6C + \rightarrow \gamma'$ *
   c. $MC_2 + \gamma \rightarrow M_6C + \rightarrow \gamma'$
   d. all of the above

161. Two types of M_3B_2 borides have also observed in
   a. U-200
   b. U-300
   c. U-700 *
   d. U-800

162. Where boron is 1200 PPM borides are
   a. hard refractory *
   b. soft refractory
   c. both a. & b. are wrong
   d. no effect

163. Coarsening of V' will reduce
   a. creep resistance
   b. tensile strength
   c. tension
   d. compression resistance *

164. The rate of formation of δ-phase is
   a. very fast *
   b. very slow
   c. medium
   d. none

165. The resultant δ-phase is useful to control and refine granine sine
   a. to have optimum tensile properties
   b. stress rupture ductility
   c. exceptional fatique resistance *
   d. all of the above

166. In austenitic high quaternary alloy system super alloy have their
   a. contineous matrix composition *
   b. composition
   c. both a. & b.
   d. none of the above

167. Nickel alloys are based on electron hole theory the technique is called
   a. PDMON
   b. PHACOMP *
   c. both a. & b.
   d. none of the above

168. PHACOMP calculations are made in two groups
   a. calculation of the composition of all secondary phases followed by their discard
   b. calculation of N_2 from the austenite composition
   c. both a. & b. *
   d. none of the above

169. Ni-fe alloy of which type are always prove to formation of micro and macro-segregations
   a. inco 718 *
   b. inco 700
   c. inco 761
   d. inco 881

170. White spot in Ni-fe alloy is
   a. micro organism
   b. macro segregation *
   c. both a. & b.
   d. none of the above

171. White spots corresponds to Nb lean areas and have
   a. higher boiling point
   b. higher melting point *
   c. higher fusion point
   d. none of the above

172. High temperature strength of super alloys in addition to their composition depend on
   a. size
   b. shape
   c. distribution of microstructural phases
   d. all of the above *

173. Cobalt base alloys are strengthened by
   a. major precipitation of cubic
   b. non-coherent carbides besides solid solution strengthening
   c. both a. & b. *
   d. none of the above

174. In Ni & Ni-fe super alloys provides little additional strength at low temperature addition is required of
   a. carbides
   b. borides
   c. both a. & b. *
   d. none of the above

175. Most of the Ni and Ni-fe alloys coatain
   a. Al-Ti
   b. Nb as alloying additions for precipitation
   c. both a. & b. *
   d. none of the above

176. Stress relieiving and annealing is applicable for
   a. wrought solid sol" *
   b. cast solid sol"
   c. both a. & b.
   d. none of the above

177. Annealing during fabrication requires
   a. addition to strength
   b. relieve stress *
   c. both a. & b.
   d. none of the above

178. Holding time at annealing temperature (955^0 C to 1080^0 C) for most of the alloys varies from
   a. 1 to 2 hours *
   b. 2 to 4 hours
   c. 4 to 6 hours
   d. none of the above is correct

179. Holding time at annealing temperature requires
   a. 900 - 1050^0C
   b. 930 - 1095^0C
   c. 955 - 1080^0C *
   d. 1000 - 1010^0C

180. Highly alloyed wrought materials requires
 a. longer holding time & higher temp.*
 b. shorter holding time & lower temp
 c. longer holding time & lower temp
 d. shorter holding time & higher temp

181. For excessive grain growth holding the alloys about
 a. 20 minutes
 b. 10 minutes
 c. 15 minutes *
 d. 30 minutes

182. Principal of objective of solution heat treatment is
 a. reprecipitation in the desired shape
 b. size and distribution
 c. both a. & b. *
 d. none of the above

183. Higher solution heat treatment requires at temp
 a. 1175^0C *
 b. 225^0C
 c. 1000^0C
 d. none of the above

184. Ageing temperature for nickel-base alloys are generally higher and range from
 a. 700-800^0C
 b. 760-925^0C *
 c. 800-900^0C
 d. 900-1000^0C

185. Time duration for ageing temperature of Ni-base alloy
 a. 8 to 24 hrs * b. 6 to 25 hrs
 c. 10 to 30 hrs d. 11 to 18 hrs

186. Final ageing temperature of Ni-base alloys is
 a. 700^0C b. 730^0C
 c. 740^0C d. 780^0C *

187. Alloys 718 is ageing at temp
 a. 700^0C b. 730^0C
 c. 720^0C d. 780^0C *

188. Alloy 718 is ageing at temperature for the time of
 a. 4 hrs b. 6 hrs
 c. 8 hrs d. 10 hrs *

189. Cooling of Ni-base alloy at the rate of
 a. 50^0C/hr
 b. 55^0C/hr *
 c. 60^0C/hr
 d. none of the above

190. To obtain good stress-rupture ductility and maximum strength
 a. furnace cooling is desired
 b. air cooling is desired
 c. both first a. then b. *
 d. none of the above

191. Secondary function of ageing is to produce
 a. strength
 b. stress
 c. desirable grain boundary carbides *
 d. all of the above

192. Full annealing is mostly provided whenever
 a. high residual stress are developed during fabrication
 b. stress relieving
 c. both a. & b. *
 d. none of the above

193. The temperature required for annealing is
 a. below 55^0 C *
 b. above 55^0 C
 c. equal to 55^0 C
 d. above 60^0 C

194. The carbides that precipitate in co-base alloys are
 a. M_3C_2 (rhombic)
 b. M_7C_3 (tetragonal)
 c. $M_{23}C_6$ (cubic)
 d. all of the above *

195. M_3C_2 (rhombic) contain
 a. with lower Cr contents *
 b. with higher Cr contents
 c. both are wrong
 d. only a. and low Cr-C alloying ratio.

196. M_7C_3 (tetragonal) contain
 a. with lower Cr contents
 b. with low Cr-C alloying ratios
 c. it can transform into $M_{23}C_6$ on ageing
 d. b. and c. are correct *

197. $M_{23}C_6$ (cubic) forms
 a. in cast co-alloys during solidification as primary precipitation
 b. super alloys with lower Cr contents
 c. both a. & b. *
 d. none of the above

198. Precipitation can have a strong negative influence on low temperature ductility especially for
 a. casting alloys with carbon levels about 0.5wt *
 b. casting alloys with carbon levels above 0.5wt
 c. wrought products only

199. The reaction is strong in cobalt base alloys with in the temperature varies from
 a. 700-870^0C * b. 600-700^0C
 c. 500-600^0C d. none of the above

200. In certain alloys L-605, HS-188, M_6C transform into $M_{23}C_6$ after
 a. 300 hrs b. 3000 hrs *
 c. 4000 hrs d. 5000 hrs

201. In certain alloys L-605, HS-188, M_6C transform in $M_{23}C_6$ after 3000 hrs exposure at
   a. $816\text{-}927^0$ C *
   b. $800\text{-}900^0$ C
   c. $700\text{-}800^0$ C
   d. $600\text{-}700^0$ C

202. Primary and secondary remitting operation to obtain
   a. desired chemistry with high recovery of alloying elements
   b. freedom from contamination, gases, impurities and non-metallic inclusions
   c. both a. & b. *
   d. none of the above

203. The choice of melting sequence for the production ultimately dependent on the
   a. quality
   b. cost and intended use of the final product
   c. both a. & b. *
   d. none of the above

204. Primary melting of super alloys is mostly carried out
   a. air electric furnaces
   b. vaccum induction melting unit
   c. depending on the cleanliness requirements and class of the eomponent intended from the alloy
   d. all of the above *

205. AIM stands for
   a. air induction melting *
   b. aircraft industary melting
   c. air industary management
   d. all indian manufactures

206. Advantage of primary melting in electric furnance
   a. wide flexibility in charge materials
   b. good temperature control
   c. fluid reactive slag for metallurgical requirement
   d. all of the above *

207. The major disadvantages include
   a. presence of refractories
   b. ambient air
   c. slag and lack of good stirring in AIM
   d. all of the above *

208. VIM stands for
   a. vaccum induction melting *
   b. vaccum indian metal
   c. valuable industry manufacturing
   d. all of the above are wrong

209. Vaccum induction melting is the primary choice of
   a. Any alloys   b. super alloys *
   c. any metals   d. none of the above

210. Use of VIM allows for the independent control of
   a. temperature   b. pressure
   c. mass transport   d. all of the above *

211. Electromagnetic stirring induced
   a. eddy current
   b. facilitates rapid homogenisation
   c. both a. & b. *
   d. none of the above

212. For better homogenisation
   a. major consituents like Ni, Fe, Co & Mo *
   b. major consituents like gold
   c. both a. & b.
   d. none of the above

213. VIM highly sophisticated melting technique developed for production of
   a. clean & high value alloys *
   b. clean & low value alloys
   c. both a. & b.
   d. none of the above

214. Isolation of the melt
   a. make contact and reaction with air
   b. prevent contact and reaction with air *
   c. provide reaction with water
   d. all of the above are wrong

215. Accelerators refining reaction
   a. remove dissolved gases and volatile constituents
   b. provide high degree of purity
   c. favour dissociation of compounds
   d. all of the above *

216. Isolation of the melt
   a. prevents contact and reactions with air
   b. produces clean melts
   c. provides control over pressure and gases with in the system
   d. all of the above *

217. Induction stirring
   a. homogenizes melt composition
   b. brings reactants to melt
   c. provides superior composition control
   d. all of the above *

218. Benefits of VIM process are
   a. isolation of the melt
   b. accelerates refining reactions
   c. induction stirring
   d. all of the above *

219. Limitations of VIM process are
   a. casting of electrodes
   b. melt/refractory *
   c. both a. & b.
   d. none of the above

220. Segregation of solutes on a macro and micro scale during solidification the outcome will be
   a. need remelting *
   b. need not remelt
   c. melting does not require
   d. none of the above

221. Benefits of VIM process are
    a. casting of electrodes
    b. induction stirring *
    c. melt/retractory reaction
    d. none of the above

222. Three basic refining process are
    a. vaccum degassing
    b. vaccum oxygen
    c. both of a. & b.*
    d. none of a. & b.

223. Three basic refining process are
    a. vaccum degassing
    b. vaccum oxygen
    c. argon
    d. all of the above *

224. In vaccum degassing (VD) process
    a. the molten metal is degassed in a seperate vassel by below atmosphic temperature *
    b. atmosphic temperature is maintained
    c. both of the above
    d. none of the above

225. AOD stands for
    a. argon of decarburisation
    b. argon oxygen decarburisation *
    c. both a. & b.
    d. none of the above

226. Presently in vogue for super alloys in the country are
    a. vaccum arc remelting
    b. electroslag remetting
    c. both a. & b. *
    d. none of the above

227. ESR stands for
    a. electroslag remelting *
    b. electrical simple remelting
    c. emergency simple remelting
    d. all are wrong

228. The aim of ESR is to produce
    a. high quality ingot through a combination of chemical refining and controlled solidification *
    b. low quality of ingot
    c. both a. & b.
    d. none of the above

229. EBM stands for
    a. electron below melting
    b. electron beam melting *
    c. both a. & b.
    d. none of the above

230. EBM there is no contamination from the
    a. air
    b. slag
    c. crucible
    d. all of the above *

231. Refining efficiency is extremely high due to
    a. hard vaccum
    b. the intense heat generated by the bombarding electrons
    c. both a. & b. *
    d. none of the above

232. EBCHR stands for
    a. electron beam cold hearth refining *
    b. electron bottom cold hearth refining
    c. electron beam cool hearlth refining
    d. all of the above are wrong

233. EBCHR applied to super alloy to improve
    a. purity
    b. cleanliness
    c. both a. & b. *
    d. none of the above

234. The advantage of EBCHR are
    a. provides sufficient resident time to volatisation
    b. prevents insoluble constituents
    c. vaporisation of unwanted residual and tramp element to almost undetectable levels
    d. all of the above *

235. VAR process is initiated by striking an arc into
    a. metal chips
    b. a small quantity of which is placed at the bottom of the constantly water cooled copper crucible
    c. both a. & b. *
    d. none of the above

236. VAR stands for
    a. vaccum arc remelting *
    b. value and remove
    c. vaccum and removal
    d. none of the above

237. Depending on the type of alloy and crucible size used
    a. the ingot is air cooled
    b. slow cooled
    c. annealed
    d. all of the above *

238. ESR stands for
    a. electro slag remelting *
    b. electronic sound recording
    c. electron sample reconditioning
    d. all of the above

239. The electrode is immersed in a
    a. molten slag * b. only cold slag
    c. both in any condition d. none of the above

240. The most of the flux used for melting super alloy & special steels is
    a. CaF_2
    b. 70% CaF_2 + 30% CaO
    c. 60% CaF_2 + 40% CaO
    d. both a. & b. *

241. With some quantity of Al_2O_3 to be better choice for
a. eliminating sulphur
b. eliminating phosphorus
c. eliminating silicate
d. all of the above *

242. Means of VADER
a. vaccum arc double electrode remelting *
b. value and double electrode remelting
c. value and double electric remelting
d. none of the above

243. In VADER process
a. one consumable electrode is used
b. two consumable electrodes are used *
c. three consumable electrodes are used
d. four consumable electrodes are used

244. Benefits of VADER compared to the normal VAR
a. there is no vapor deposits on the mould wall *
b. requires only 80% energy
c. produces grain of 1-4 ASTM
d. all of the above

245. In VADER process what is the percentage of energy requires
a. 20% b. 30%
c. 50% * d. 100%

246. The ingots are amenable to
a. radiography
b. eddy current
c. ultrasonic *
d. all of the above

247. In electron beam melting the refining efficiency is extremely
a. high *
b. low
c. medium
d. very low

248. Extremely high efficiency in EBM is due to
a. hard vaccum
b. intense localised heating
c. both a. & b. *
d. none of the above

249. There is no contamination in EBM from the
a. air
b. slag
c. crucible
d. all of the above *

250. Refining efficiency is extremely high due to
a. hard vaccum
b. intense heat generated by the bombording electrons
c. both a. & b. *
d. none of the above

251. IBCHR are applicable to
a. any alloy
b. super alloy *
c. any metal
d. all of the above

252. Unsatisfactory result in IBCHR is
a. unmelted raw material constituents *
b. melted raw material
c. as in (a) and in the cast ingot
d. all of the above

253. The IBCHR consists of
a. melting of solid
b. particulate feedstock charged
c. both a. & b. *
d. none of the above

254. Melting takes place in EBCHR
a. less than one beam
b. one or more electron beams *
c. electron beam does not require
d. none of the above

255. The molten metal transverses
a. along the hearth by gravity
b. along b/y the force
c. both a. & b. required *
d. none of the above

256. Pouring of molten metal into a mouled is carried out where solidification is controlled by
a. electron beam does not require
b. another electron beam *
c. both a. & b.
d. none of the above

257. In IBCHR process
a. high voltage supply is required *
b. high current supply is required
c. low voltage supply is required
d. low current is required

258. High energy electrons impinges the material and transforms
a. kinetic energy into mechanical energy
b. kinetic energy into thermal energy
c. kinetic energy into potential energy
d. potential energy into kinetic energy *

259. The advantages of the process are
a. to provides sufficient resident time
b. to prevents insoluble constituents
c. O_2 & N_2 levels to be significantly lower *
d. all of the above

260. Non-metallic inclusions can be mechanically removed in the advantage of
a. IMR b. EBCHR *
c. BCHR d. CHR

261. EBCHR process if economically upscaled for production of
 a. alloys
 b. materials
 c. super alloys *
 d. ingots

262. The evolutionary development follows a general trend towards
 a. high Ni content *
 b. high iron content
 c. high zinc content
 d. all of the above are correct

263. Development followed a general trend towards
 a. high Ni content
 b. lower iron content
 c. increased refractory
 d. all of the above *

264. Newer alloys thus designed resulted in restriction of super alloys
 a. cold worked
 b. hot worked *
 c. no working is necessary
 d. normalising

265. Successful scale up from dented casting technology and necessary technical improvements resulted in investment
 a. casting of super alloy *
 b. forging of super alloy
 c. normalizing
 d. all of the above

266. Turbine aerofoils are manufactured from
 a. any alloy available
 b. super alloys *
 c. only casting of any alloys
 d. all of the above

267. First step of investment casting is to produce
 a. an exact replica
 b. pattern of the part in wax
 c. plastic or combination of a. & b. *
 d. none of the above

268. Plastics are used selectively to have
 a. high strength and impact resistance
 b. long-shelf life
 c. both a. & b. *
 d. none of the above

269. Ceramic core have following characteristics
 a. to be strong to with stand the forces of wax injection
 b. to be chemically comptible with the alloys poured around it
 c. should be removed from the cast part
 d. all of the above *

270. Core materials currently are limited to high percentage of
 a. silica
 b. kolt
 c. NaOH
 d. all of the above *

271. KOH & NaOH acids does not act on
 a. any metal
 b. any alloys
 c. super alloys *
 d. all of the above

272. Current core practice permits castings with
 a. 0.04 thick wall
 b. 0.04 thick slots
 c. both a. & b. *
 d. 0.5 cm thick slots only

273. Assembled pattern is coated with or dipped with
 a. face coat *
 b. shell making
 c. both a. & b.
 d. none of the above

274. Face coat consists of
 a. 4.8% of nucleating agent
 b. 3.8% of nucleating agent *
 c. 4.2% of nucleating agent
 d. 3.0% of nucleating agent

275. Face coat consists of
 a. cobalt b. aluminium
 c. silicate d. all of the above *

276. After face coat the cluster is immersed in an
 a. aqueous ceramic slurry *
 b. hydrocloric acid
 c. both a. & b.
 d. none of the above

277. A typical shell mouled consists of
 a. 3-4 layers b. 5-10 layers *
 c. 9-12 layers d. 15-20 layers

278. Commonly occuring defects in super alloy investment constings are
 a. non-metallic inclusions
 b. tears
 c. cold struts
 d. all of the above *

279. To overcome creep which of the following action will be taken
 a. control of grain boundary events during operation so as to make the consequences being
 b. elimination of grain boundaries across the principal stress axis
 c. both a. & b. *
 d. none of the above

280. Directional solidification is accomplished in
   a. dry air
   b. wet air
   c. vaccum *
   d. all of the above

281. Zirconia is preferred due to former being of better refractory nature at the involved
   a. high temperature *
   b. low temperature
   c. temperature with no effect
   d. none of the above

282. A bottle is placed at the bottom of the farnace to increase the
   a. heat
   b. thermal gradient *
   c. both a. & b.
   d. none of the above

283. The initial columnar grain structure started
   a. above the chill plate *
   b. below the chill plate
   c. without chitt plate is required
   d. none of the above

284. Components(blades) made out of directional solidification are superior to conventional investment cast blades due to
   a. elimination of the grain boundary
   b. enabling g γ ' micro structure to be refined with a solution heat treatment
   c. presence of preferred low modulus
   d. all of the above *

285. Advantage of single crystal casting process
   a. enhancement in thermal fatigue resistance *
   b. low brittleness
   c. decrease stress
   d. all of the above

286. Turbine blades are made of
   a. MS technique
   b. DS technique *
   c. LS technique
   d. MV technique

287. Grain boundary strengthening elements remains essential for these blades
   a. C b. B
   c. Zr d. all of the above *

288. Absence of grain boundaries in single crystals eliminates
   a. addition of grain boundary strengtheners
   b. resulting in increase of about 90^0 C in incipient melting temperature
   c. both a. & b. *
   d. none of the above

289. Nominal composition of currently used alloy for polycrystal
   a. Mar-M-247 *
   b. Mar-M-240
   c. Mar-L-231
   d. all of the above

290. Recent development to improve properties of single crystal alloys has been through judicious additon of
   a. barillyum
   b. boron
   c. rhenium *
   d. all of the above

291. Directional solidification presents
   a. alloys
   b. super alloys *
   c. materials
   d. none of the above

292. Single crystal alloys are less complex than
   a. DS alloy *
   b. MS alloy
   c. LS alloy
   d. all of the above

293. During solidification structure controlled turbine blades are as follows
   a. grain misorientation
   b. micro porosity
   c. macro segregation
   d. all of the above *

294. The leading and trailing edge shall consists of a single grain with
   a. no grain boundries *
   b. grain boundries
   c. grain boundries sometime requires
   d. all of the above

295. In DS blades minimum number of grains to be defined with no grain exceeding
   a. 30% of width of blade
   b. 40% of width of blade *
   c. 20% of length of blade
   d. 30% of length of blade

296. Freekles consists of small vertical channels of equiaxed grains which are nucleated ahead of the
   a. advancing solid-liquid interface by dendritic debris thrown up from the solidification front *
   b. macro segregation present
   c. both a. & b.
   d. none of the above

297. Inclusions are foreign particles which become
   a. embedded on surface
   b. subsurface during solidification process
   c. both a. & b. *
   d. none of the above

298. Reaction products of various reactive elements present in the molten alloy with the
   a. O_2 in the furnance atmosphere *
   b. N_2 in the furnance atmosphere
   c. CO_2 in the furnance atmosphere
   d. CO in the furnance atmosphere

299. Mostly dross inclusions are found on the
   a. intra structure
   b. surface *
   c. below the surface
   d. all of the above

300. Nickel and nickel-iron base alloys are used to fabricate
   a. gas turbine discs *
   b. jet engine blades
   c. integrally cast turbine wheels
   d. all of the above

301. Super ni 75 A is a
   a. heat & corrosion resistance
   b. deformable
   c. non-aging & weldable
   d. all of the above *

302. BS HR5 are equivalent designations of
   a. bars
   b. drillets
   c. forgings & parts
   d. all of the above *

303. BS HR 203 are equivalent designations of
   a. plate
   b. sheet
   c. strip
   d. all of the above *

304. For manufacturing plate, sheet and strip we use
   a. BS HR 203
   b. MSRR 7104
   c. both a. & b. *
   d. none of the above

305. Ty - 14 - 1 - 1671 - 76 is equivalent designation of
   a. forged
   b. as in (a) and hot rolled bars *
   c. plates
   d. NI of the above

306. Ty - 14 - 1 - 1747 - 76 equivalent designation of
   a. cold rolled sheets *
   b. bars
   c. billets
   d. strip

307. BSEM 550 is equivalent designation of
   a. bars
   b. billets
   c. forgings bars and forgings for machining
   d. all of the above *

308. NC 20T is equivalent designatery
   a. bars
   b. billets
   c. forgings
   d. all forms *

309. commercial designation of superni 75 are
   a. BS, HR5
   b. BS, HR 203
   c. MSRR 7104
   d. all of the above *

310. In sheet for hot rolling requires
   a. $\leq$ 3 mm thickness
   b. < 3 mm thickness
   c. > 3 mm thick ness *
   d. > 2 mm thickness

311. For machining bars and billets
   a. annealed is required *
   b. as fabricated
   c. both a. & b.
   d. none of the above

312. Primary melting in
   a. vaccum industry melting
   b. vaccum induction melting *
   c. both a. & b.
   d. electro slg remetting

313. Secondary melting in
   a. vaccum induction melting
   b. various induction melting
   c. electro slag remelting *
   d. all of the above

314. Thermo meahanical processing are
   a. forging
   b. hot rolling
   c. cold rolling
   d. all of the above *

315. Hot rolling
   a. midhani's bar mill for bar products
   b. midhani's sheet mill for sheet products
   c. both a. & b. *
   d. none of the above

316. Superni SOAA is a
   a. wrought nickel-chromium alloy *
   b. cast nickel-chromium alloy
   c. wrought iron-base alloy
   d. cast iron base alloy

317. Superni SOAA has
   a. corrosion resistance
   b. heat resistance
   c. hardenable alloy
   d. all of the above *

318. Carbide distribution obtained in SOAA alloy by
 a. two stage of heat treatment
 b. solution heat treating
 c. ageing
 d. all of the above *

319. Along the grain boundries these carbides transform to $M_{23}C_6$ between
 a. 600 - 800^0 C *
 b. 400 - 500^0 C
 c. 500 - 800^0 C
 d. 800 - 900^0 C

320. Thermo mechanical processing are
 a. forging
 b. cold rolling
 c. hot rolling
 d. all of the above *

321. Superni 263A is a
 a. heat resistant
 b. deformable
 c. age hardenable
 d. all of the above *

322. Initally developed as sheet material to meet specific design criteria in terms of
 a. 0.3% proof stress
 b. 0.2% proof stress *
 c. 0.4% proof stress
 a. 0.5% proof stress

323. Superni 263A has
 a. three stage heat treatment
 b. one stage heat treatment
 c. two stage heat treatment *
 d. none of the above

324. BS HR10 is equivalent designation for
 a. bars
 b. billet
 c. forgings
 d. all of the above *

325. BSHR 206 is equivalent designation for
 a. plate
 b. sheet
 c. strip
 d. all of the above *

326. AMS 5872 is equivalent designation for
 a. plate, sheet, strip *
 b. bar
 c. billet
 d. forgings

327. MSRR 7035 is equivalent designation for
 a. billets b. bars
 c. forging parts d. all of the above *

328. MSRR 7036 is equivalent designation for
 a. plate
 b. sheet
 c. both *
 d. none

329. Superni 263 have equivalent designation for
 a. BS HR10
 b. BS HR 206
 c. AMS 5872
 d. all of the above *

330. For designation of plate, sheet & strip
 a. BS HR 206
 b. AMS 5872
 c. both *
 d. none

331. Melting range of superni 263 is
 a. 1300^0 C - 1355^0 C *
 b. 1200^0 C - 1300^0 C
 c. 1100^0 C - 1200^0 C
 d. 1000^0 C - 1100^0 C

332. Supply conditions for superni 263 of over 6 mm
 a. hot rolled
 b. solution heat treatment
 c. both a. & b. *
 d. none of the above

333. Superni 600A is a alloy of
 a. nickel
 b. chromium
 c. iron
 d. all of the above *

334. Superni 600A is a
 a. heat & corrosion resistance
 b. deformable
 c. non-aging
 d. all of the above *

335. Superni 600A has
 a. good forming characteristics
 b. easily dellusion welded
 c. both a. & b. *
 d. none of the above

336. DTD is equivalent designation for
 a. sheet
 b. strip
 c. both a. & b. *
 d. none of the above

337. AMS 5540 is equivalent designation for
 a. plate
 b. sheet
 c. strip
 d. all of the above *

338. AMS 5580 is equivalent designation for
   a. tubes seamless *
   b. sheets
   c. strips
   d. bars

339. ASTM B 163 is equivalent designation for
   a. seamless condenser
   b. heat exchanger tubes
   c. both a. & b. *
   d. none of the above

340. ASTMB 166 is equivalent designation for
   a. bar
   b. rod
   c. both a. & b. *
   d. none of the above

341. ASTMB 167 isequivalent designation for
   a. bars
   b. rods
   c. forgings
   d. all of the above *

342. ASTMB 168 is equivalent designation for
   a. plate
   b. sheet
   c. strip
   d. all of the above *

343. Thermal melting range of superni 600A is
   a. 1370 - 1425^0 C *
   b. 1200 - 1300^0 C
   c. 1100 - 1200^0 C
   d. 1000 - 1200^0 C

344. Density of superni 600A is
   a. 8 g/cm^3
   b. 8.3 g/cm^3 *
   c. 8.1 g/cm^3
   d. 9 g/cm^3

345. At the temperature RT-100 the linear expansionof superni 600 A will be
   a. 14.00
   b. 13.00
   c. 15.85 *
   d. 16.00

346. Notch fatique strength of superni 600 A at the temperature of -80 the stress is
   a. 280 *　　b. 290
   c. 270　　d. 260

347. Application of superni 600A are
   a. combustor pipe
   b. jet pipes
   c. high temperature furnance components
   d. fixtures & a , b & c *

348. Manufacturing of jigs is done from
   a. superni 600A *
   b. superni 580A
   c. superni 500A
   d. none of the above

349. Superni 718A is a
   a. nickel alloy
   b. chromium alloy
   c. both above *
   d. none of the above

350. Superni 718 A has a
   a. heat & corrosion resistance
   b. auge hardenable
   c. deformable
   d. all of the above *

351. AMS is equivalent designations for
   a. bars
   b. forgings
   c. rings
   d. all of the above *

352. AMS 5662 is equivalent designations for
   a. bars *
   b. sheet
   c. strip
   d. all of the above

353. AMS 5664 is equivalent designations for
   a. forgings *
   b. sheet
   c. strip
   d. plate

354. AMS 5597 is equivalent designations for
   a. sheet
   b. strip
   c. plate
   d. all of the above *

355. AMS 5590 is equivalent designation for
   a. sheet
   b. seamless tubing *
   c. forgings
   d. all of the above

356. Superni 718A is mainly used for
   a. gas turbine discs
   b. compressors
   c. components for liquid rocket
   d. all of the above *

357. For manufacturing cryogenic tankage slings
   a. superni 718A *
   b. superni 118A
   c. superni 280A
   d. none of the above

358. CM-247C is modified version of
   a. mar-M-247 *
   b. mar-L-240
   c. mar-O-241
   d. all of the above

359. The primary alloying modification are the reduction of
   a. carbide
   b. carbon *
   c. chromium
   d. chloride

360. Additionally W and Mo levels in the alloy are slightly reduced to compensate for the
   a. lower C and Ti concentration
   b. minimising the formation of deleterious secondary MEC plates
   c. both a. & b. *
   d. none of the above

361. The density of CM-247LC alloys have
   a. 8.54 g/cm^3 *
   b. 9.00 g/cm^3
   c. 7.00 g/cm^3
   d. 6.00 g/cm^3

362. Which of the latest in the series of nickel base alloy is
   a. MAR - M - 247 *
   b. DE - M - 240
   c. LM - L - 242
   d. all of the above

363. Advantage of using MAR - M - 247 alloy are
   a. high strength
   b. elevated temperature
   c. both a. & b. *
   d. none of the above

364. In MAR - M - 247
   a. Directionally solidified
   b. no thermal mechanical processing is required
   c. both a. & b. *
   d. none of the above

365. Melting range of MAR - M - 247 is
   a. 1315 - 1370^0 C * b. 1300 - 1400^0 C
   c. 1200 - 1300^0 C d. 1100 - 1400^0 C

366. Density of MAR - M - 247 is
   a. 8 gm/cm^3 b. 8.5 gm/cm^3 *
   c. 9 gm/cm^3 d. 10 gm/cm^3

367. In cyclic oxidation resistance requires
   a. 1100^0 C temperature
   b. 100 hrs time
   c. 3.0 g/cm^2 height
   d. all of the above *

368. Application of CM - 247 are
   a. turbine rotor
   b. nozzle guid vanes
   c. both a. & b. *
   d. none of the above

369. VIM appreciably decreases
   a. volatile base elements *
   b. nonvolatile base elements
   c. both base element
   d. none of the above

370. Electroy beam cold hearth refining (EBCHR) process promises reduced
   a. inclusion size
   b. their frequency
   c. both a. & b. *
   d. none of the above

371. In EBCHR practically it is difficult to control the composition
   a. within the specified limits *
   b. more than the time
   c. less than the specified limit
   d. none of the above

372. This phenomenon is amplified by the volume of liquid metal due to the greater difference between the solidus & liquid temperatures
   a. > 65^0 C
   b. > 75^0 C *
   c. < 75^0 C
   d. > 100^0 C

373. Three major types of macro segregation are
   a. tree rings
   b. freckles
   c. white spot
   d. all of the above *

374. Sound & consistent VIM electrodes allow maximum
   a. course tuning
   b. fine tuning
   c. both a. & b. *
   d. none of the above

375. Higher melting rate results in
   a. high cooling rate
   b. short local solidification
   c. both a. & b. *
   d. low temperature required

376. AE - 435 is a
   a. nickel base alloy *
   b. iron base alloy
   c. chromium base alloy
   d. all of the above

377. Advantage of using AE - 435
   a. heat resistant b. deformable
   c. non-aging d. all of the above *

378. AE - 435 intended for
    a. high load parts
    b. low load parts *
    c. medium load parts
    d. load does not take

379. Chromium rich $M_{23}C_6$ type carbides are also seen at
    a. internal structure
    b. bottom structure
    c. grain boundaries *
    d. none of the above

380. AE - 435 is subjected to
    a. quenching
    b. annealing *
    c. normalising
    d. all of the above

381. BS : HR 5 is equivalent designation for
    a. billet
    b. bar
    c. forgings
    d. all of the above *

382. BS : HR 203 is equivalent designation of
    a. plate
    b. sheet
    c. strip
    d. all of the above *

383. MSRR 7104 equivalent designation for
    a. plate *
    b. billet
    c. bar
    d. all forms

384. MSRR 7036 is equivalent designation for
    a. bars
    b. forgings
    c. both a. & b. *
    d. billet

385. NC 20T forms
    a. booms
    b. sheets
    c. all forms *
    d. none of the above

386. NC 20T is equivalent designation for
    a. billets
    b. bars
    c. forgings
    d. all of the above *

387. AE 435 is extensively used in
    a. combustor parts
    b. exhaust cone
    c. jet pipes
    d. all of the above *

388. Flame tabe flanges are made up of
    a. AE 435 *
    b. AE 400
    c. AE 420
    d. AE 440

389. AE 868 is a solid solution of
    a. fe-base alloy
    b. nickel base alloy *
    c. copper base alloy
    d. all of the above

390. Advantages of AE 868 is
    a. heat resistance
    b. deformable
    c. non-agin
    d. all of the above *

391. AE 868 consists of a uniform solid solution at
    a. below temperature *
    b. above temperature
    c. all temperature
    d. temperature not consider

392. General constituents of AE 868
    a. carbides
    b. nitrides
    c. carbonitrate
    d. all of the above *

393. Melting range of AE 868
    a. 1340^0 C - 1380^0 C *
    b. 1300^0 C - 1200^0 C
    c. 1400^0 C - 1500^0 C
    d. none of the above

394. Coefficient of linear expansion at 20-100^0 C
    a. 13.66
    b. 12.66 *
    c. 14.54
    d. 15.30

395. Coefficient of linear expansion of AE 868 at 200-300^0 C
    a. 14.54 *
    b. 15.30
    c. 16.16
    d. 17.08

396. Cofficient of linear expansion's unit is
    a. μ g/m.k
    b. μ κg/m.k
    c. μ m/m.k *
    d. all of the above

397. Density of the AE 868 is
    a. 8.88 g/cm^3 *
    b. 4.44 g/cm^3
    c. 2.22 g/cm^3
    d. 4.249 g/cm^3

398. Oxidation resistance of AE 868 is at temperature 1100^0 C then
   a. duration 400 hrs
   b. duration 100 hrs *
   c. duration 200 hrs
   d. duration 300 hrs

399. Application of AE 868 is used for
   a. combustion chamber
   b. pipelines in hot 20 hrs
   c. reheat chamber diffusor
   d. all of the above *

400. ZC6K - BE is a
   a. cast super alloy *
   b. wrough super alloy
   c. only alloy
   d. none of the above

401. ZC6K - BE super alloy offers
   a. heat resistance
   b. strengthened
   c. creep resistance
   d. all of the above *

402. ZC6K - BE developed as a material for gas turbines where temperature exceeds
   a. 500^0 C
   b. 1000^0 C *
   c. 1500^0 C
   d. 2000^0 C

403. ZC6K - BE used in turbine engine for
   a. nozzle guide vanes *
   b. exhaust pipe
   c. body construction
   d. skin

404. Application of ZC67 - BE used for
   a. turbine blades
   b. nozzle guide vanes
   c. turbine rotor blades
   d. all of the above *

405. ZC6K - PBD is used where temperature exceed
   a. 500^0 C
   b. 700^0 C
   c. 1000^0 C *
   d. 1200^0 C

406. Density of ZC6K - PBD is
   a. 7.00 g/cm^3
   b. 8.25 g/cm^3 *
   c. 9.00 g/cm^3
   d. 8.00 g/cm^3

407. Heat treated condition applied for the super alloy is
   a. temperature 1100 ± 10^0 C
   b. temperature 1220 ± 10^0 C *
   c. temperature 1300 ± 100^0 C
   d. none of the above

408. Time period for the material is
   a. 2 hours
   b. 4 hours *
   c. 6 hours
   d. 8 hours

409. ZC 6K - PBD used in critical aeroengine for manufacturig
   a. turbine blades *
   b. nozzle vanes
   c. skin
   d. all of the above

410. BZL-12 Y alloy posses maximum high temperature
   a. 500^0 C
   b. 1000^0 C *
   c. both upper & lower limit
   d. none of the above

411. Density of the BZL-12 Y alloy is
   a. 6.00 g/cm^3
   b. 7.00 g/cm^3
   c. 7.93 g/cm^3 *
   d. 8.00 g/cm^3

412. Application of BZL-12 Y super alloy in aeroengine is
   a. nozzle vanes
   b. guide vanes
   c. turbine blades *
   d. all of the above

413. AE 437 is a
   a. wrought iron base super alloy *
   b. cast iron base super alloy
   c. cast nickel base super alloy
   d. wrought nickel base super alloy

414. AE 437 is mainly used in A/C components operating below
   a. 400^0 C
   b. 800^0 C *
   c. 700^0 C
   d. 400^0 C

415. AE 437 obtained by two heat treatment
   a. solution heat
   b. aging
   c. both a. & b. *
   d. none of the above

416. The density of AE 437 is
   a. 8.2 g/cm^3 *
   b. 8.1 g/cm^3
   c. 8.5 g/cm^3
   d. 8.9 g/cm^3

417. Application of AE 437 is
   a. blades
   b. pins
   c. bolts
   d. all of the above *

418. Application of AE 437 is
   a. bushes
   b. tierods
   c. brackets
   d. all of the above *

419. AE 437B found in
   a. nickel base alloy *
   b. iron base alloy
   c. copper base alloy
   d. silver base alloy

420. Advantage of AE 437B is
   a. heat resistance
   b. corrosion resistance
   c. age hardenable
   d. all of the above *

421. Near equivalent designations of AE-437B is
   a. nimonic - 80A *
   b. nimonic - 79B
   c. nimonic - 65A
   d. nimonic - 50C

422. Which of the following is the superior creep strength
   a. AN 437A
   b. AN 437B *
   c. both have same strength
   d. none of the above

423. Application of 437B is
   a. turbine blades
   b. turbine disks
   c. bushes
   d. all of the above *

424. Impact strength of HR bars is
   a. 60
   b. 70 *
   c. 75
   d. 80

425. AE 602 is a
   a. iron base alloy
   b. nickel base alloy *
   c. cobalt base alloy
   d. all of the above

426. AE 602 is a
   a. heat resistance
   b. deformable
   c. non-ageing alloy
   d. all of the above *

427. Primarily which are the general form of the alloy
   a. carbides
   b. nitrides
   c. carbonitride
   d. all of the above *

428. Chromium rich M_6C, $M_{23}C_6$ type carbides are seen in
   a. grain boundaries *
   b. bottom of the structure
   c. no carbides formed
   d. none of the above

429. Application of AE 602
   a. combustion chamber
   b. reheat deffusor
   c. turbine sealing
   d. all of the above *

430. Superfer 696M is a
   a. austenitic type iron base *
   b. cobalt base alloy
   c. nickel base alloy
   d. all of the above

431. Advantages of 696M super alloy is
   a. heat resistant
   b. corrosion resistant
   c. oxidation resistant
   d. all of the above *

432. Commercial designation of iron-base alloys is
   a. superfer 690
   b. superfer 696 *
   c. superfer 650
   d. superfer 700

433. Coefficient of linear expansion $(20\text{-}100)^0$ C is
   a. 17.5
   b. 18.0
   c. 16.9 *
   d. none of the above

434. Elastic properties at 20^0 C temperature
   a. 179 Gpa *
   b. 180 Gpa
   c. 181 Gpa
   d. 182 Gpa

435. Elastic properties at 600^0 C temperature
   a. 179 Gpa
   b. 128 Gpa *
   c. 122 Gpa
   d. 119 Gpa

436. Superfer 696M is used in manufacturing of
   a. turbine casing joining
   b. fasteners
   c. blades of gas turbines
   d. all of the above *

437. Superfer 696M operating temperature at
   a. 600^0 C
   b. 750^0 C *
   c. 500^0 C
   d. 800^0 C

438. Thermal conductivity of superfer 696M at 20^0 C is
   a. 12 w/m.k *
   b. 13 w/m.k
   c. 15 w/m.k
   d. 20 w/m.k

■■■

CHAPTER - 24
TOOL AND DIE MATERIALS

1. Hardness is the property of a material to -------------- penetration by another material.
   a. Resist * b. Helps
   c. Locate d. None of the above.

2. Tool has to be ------------------ than the job material.
   a. Harder * b. Softer
   c. Equal hand d. None of the above.

3. ------------------ ability to resist abrasion called
   a. Wear resistance * b. Toughness
   c. Hardness d. None of the above.

4. ------------------ ability to absorb energy and deform plastically before fracturing.
   a. Hardness b. Wear resistance
   c. Toughness * d. Stiffness

5. Ability to withstand shock loading without breakage is called
   a. Hardness b. Stiffness
   c. Toughness d. Impact strength *

6. The ability of a metal to resist elastic deformation is called.
   a. Stiffness * b. Impact strength
   c. hardness d. Toughness

7. The capacity of a metal to exhibit considerable elastic recovery upon release of load is called
   a. Hardness b. Stiffness
   c. Toughness d. Reselience *

8. ------------------ ability of a material to conduct heat in order to run cool.
   a. Thermal conductivity *
   b. Electrical conductivity.
   c. Chemical conductivity.
   d. None of the above.

9. Tool material must have low ------------------ so that less heat is generated at the tool tip.
   a. Coefficient of expansion.
   b. Coefficient of friction *
   c. Weight to strength ratio.
   d. All of the above.

10. Tool material must have high ------------------ to bear cutting stresses and to resist disintegration of cutting edge.
    a. Strength *
    b. Coefficient of friction
    c. Coefficient of thermal expansion
    d. None of the above.

11. Plain carbon steel contain carbon upto
    a. 1.4 to 1.5% * b. 2.0 to 2.4%
    c. 2.2 to 2.9% d. 2.6 to 2.7%

12. High speed steel start loosing hardness at about.
    a. 120°C b. 140°C
    c. 200°C * d. 950°C

13. Cast-Non ferrous materials are
    a. Less red hard b. Ductile
    c. Brittle * d. None of the above.

14. Cast-Non ferrous materials possess____________ resistance to corrosion.
    a. High * b. Poor
    c. Average d. None of the above.

15. Cast -Non ferrous material possess
    a. Greater red hardness
    b. Brittleness
    c. Low resistance to shock
    d. All of the above *

16. Stellite contains Cr upto
    a. 25 to 75% b. 25 to 35% *
    c. 35 to 42% d. 35 to 60%

17. Stellite contains
    a. 23% Al
    b. 22% Al
    c. 12% Al
    d. None of the above (No Aluminium) *

18. Stellite contains carbon upto
    a. 10 to 15% b. 10 to 12%
    c. 1 to 3 % * d. 5 to 19%

19. Stellite contains tungsten between
    a. 4 to 15% b. 4 to 25% *
    c. 4 to 35% d. 4 to 45%

20. The hardness of stellite varies from Rockwell
    a. C40 to 60 * b. C40 to 150
    c. C60 to 80 d. C80 to 90

21. Stellite is widely used for machining
    a. Cast Iron b. Steel & stainless steel
    c. Cast steel & Brass d. All of the above *

22. Stellite cutting tools are used as
    a. Single point lathe tool *
    b. Multi point lathe tool
    c. Multi point milling tool
    d. None of the above.

23. Cemented carbides are manufactured with the help of
    a. Crusting two metals b. Casting & Polishing
    c. Powder metallurgy * d. None of the above.

24. Sintering is a process involve in
    a. Casting b. Welding
    c. Polishing d. Powder metallurgy *

25. Cemented carbide contain Co upto
    a. 2.6% to 16% * b. 4.5% to 25%
    c. 6.5% to 30% d. 9.5% to 32%

26. Cemented carbide possess -------------- wear resistance
    a. Excellent * b. Average
    c. Poor d. Nil

27. Cemented carbide possess
    a. Excellent toughness b. Good toughness
    c. Average Toughness d. Poor toughness *

28. Ceramics tools contain mainly a large amount of
    a. Al_2O_6 b. Al_2O_3 *
    c. Fe_2O_3 d. SiO_3

29. Ceramic tools contain
    a. 92% Al_2O_3 b. 67% Al_2O_3
    c. 72 % Al_2O_3 d. 98% Al_2O_3 *

30. Ceramic tools contain Binder upto
    a. 9% b. 7%
    c. 4% d. 2% *

31. Ceramic tools are produced by
    a. Cold Pressing b. Hot Pressing
    c. Both (a) & (b) * d. Neither (a) nor (b)

32. Ceramic tools possess a life ---------------------- times longer than a carbide tool.
    a. 5 to 20 b. 1 to 4
    c. 3 to 20 d. 3 to 10 *

33. Ceramic tools can remove metals at
    a. High rates * b. Up to 4000°C
    c. Both (a) & (b) d. Neither (a) nor (b)

34. Ceramic tools retain their strength and hardness upto
    a. 1800°C b. 1600°C
    c. 2000°C d. 1200°C *

35. Ceramic tools can readily machine materials as hard as Rc
    a. 46 b. 42
    c. 66 * d. 60

36. Ceramic tools are
    a. Softer b. Ductile
    c. Brittle * d. None of the above.

37. Ceramic tools tends to chip
    a. Easily * b. Relatively difficult
    c. Can't say (depends upon cutting speed)
    d. Depends on cutting temp.

38. ------------------ need more rigid machines than required for other cutting tools to operate successfully.
    a. Cemented carbide b. Ceremic tools *
    c. High speed steels d. All of the above.

39. Ceremic tools need ---------------------- horse-power to cut efficiently
    a. More * b. Less
    c. 100 to 400 d. None of the above.

40. Ceramic tools are ________________costly other than tools.
    a. More * b. Less
    c. Equal d. None of the above.

41. Diamond is ------------------ known material.
    a. Softest b. Lowest wear resistance
    c. Hardest * d. None of the above.

42. Diamond tools are ---------------------- wear resistant.
    a. Highly * b. Average
    c. Poor d. None of the above.

43. Diamond is a -------------------- material.
    a. Soft b. Low wear resistant
    c. Brittle * d. None of the above.

44. Diamond offers ----------------- resistance to shock.
    a. Very high b. Average
    c. Low * d. None of the above.

45. Diamond is a ------------------ metal.
    a. Cheap b. Average cost
    c. Very high cost * d. Free of cost.

46. Water hardening steel may distort during
    a. Welding b. Brazing
    c. Cooling d. Heat treatment *

47. Oil hardening steels are ----------------- to machine.
    a. Easier * b. Difficult
    c. Can't be machined d. None of the above.

48. Graphite tool steels possess high wear resistance and ------------------ lubricating qualities.
    a. Good * b. Bad
    c. Average d. Poor

49. Tungsten carbide is used for ---------------------- production rates.
    a. Uniform b. Less
    c. High * d. None of the above.

50. The heat treatment applied to HSS are
    a. Annealing * b. Nitriding
    c. Pack-carburizing d. All of the above.

■■■

CHAPTER - 25
BEARING MATERIALS

1. Bearings support
   a. Moving part * b. Cantilever Beams
   c. Stationary parts d. None of the above.

2. Bearing material should possess
   a. Low coefficient of expansion.
   b. Low coefficient of friction *
   c. High coefficient of friction
   d. None of the above.

3. A bearing material should be
   a. Wear Resistant
   b. Hard
   c. Surface with a tough core
   d. All of the above *

4. Bearing materials have ---------------------- fatigue strength.
   a. Poor b. Average
   c. High * d. None of the above.

5. Bearing material should be able to bear
   a. Shocks b. Vibration
   c. Both (a) & (b) * d. Neither (a) nor (b)

6. Bearing material possess high thermal conductivity to dissipate ------------------, generated due to friction.
   a. Heat * b. Slag
   c. Inclusions d. None of the above.

7. Bearing material should possess adequate strength at
   a. Low temperatures b. High temperatures *
   c. Low pressures d. None of the above.

8. Bearing material should be such that it can easily be
   a. Corroded b. Fabricated *
   c. Available in hill areas d. All of the above.

9. Bearing material possess ------------------ characteristics.
   a. Actesiezure b. Patheseizure
   c. Apheseizure d. Antiseizure *

10. ------------------ maintains a continuous film of oil between shaft and bearing in order to avoid metal to metal contact.
    a. Housing material b. Shaft material
    c. Bearing material * d. All of the above.

11. Lead and tin base alloys are called as
    a. Ceramic material
    b. Babitt material *
    c. Organic material
    d. None of the above.

12. Bearing material should be
    a. Cheap * b. Average cost
    c. High cost d. Free of cost

13. In bearing materials, A lead Base alloy contain lead upto
    a. 70% b. 60%
    c. 75% * d. 65%

14. In bearing materials, A tin base alloy contain Sn Upto
    a. 78% b. 88% *
    c. 52% d. 76%

15. Lead base alloys are ----------------- than tin base alloy
    a. Softer * b. Ductile
    c. Harder d. None of the above.

16. A lead base alloy is ____________than tin base alloys
    a. Harder b. As hard as
    c. Brittle * d. None of the above.

17. Lead base alloys are -------------------- than tin base alloys
    a. Cheaper * b. Costlier
    c. Having equal cost d. None of the above.

18. Tin base alloys have a ------------------- coefficient of friction as compare to lead base alloys.
    a. High b. Equal
    c. Low * d. None of the above.

19. Lead base alloys are suitable for
    a. Light loads b. Medium loads
    c. Heavy loads d. Both (a) & (b) *

20. Tin base alloys are suitable for
    a. low loads b. Medium loads
    c. Low speeds d. None of the above. *

21. Tin base alloys are suitable for
    a. Higher loads b. Higher speeds
    c. Lower speeds d. Both (a) & (b) *

22. Solidus temperature of tin base alloys are
    a. Approx 292°C b. Approx 222°C *
    c. Approx 208°C d. Approx 392°C

23. Solidus temperature of lead base alloys are
    a. Approx 222°C b. Approx 240°C *
    c. Approx 280°C d. Approx 292°C

24. White metals are
    a. Tin based b. Lead based
    c. Neither (a) nor (b) d. Tin or lead based *

25. Cadmium based alloys possess ---------------------- than tin base alloys
    a. Greater Compressive strength *
    b. Lower compressive strength.
    c. Depends on temperature.
    d. Equal compressive strength.

26. Cadmium based alloys possess.
    a. Low coefficient of friction *
    b. High coefficient of friction.
    c. Low coefficient of kinematic viscosity
    d. None of the above.

27. Cadmium based alloys possess
    a. High wear
    b. High Load carrying capacity *
    c. Low fatigue strength
    d. None of the above.

28. Cadmium -based alloy possess
    a. High fatigue strength *
    b. High wear
    c. High coefficient of thermal expansion.
    d. None of the above.

29. Cadmium based alloy possess
    a. Low wear
    b. Fair ability to embed dirt
    c. Good seizure resistance
    d. All of the above *

30. Cadmium based alloy possess
    a. Average corrosion resistance
    b. High corrosion resistance
    c. Poor corrosion resistance *
    d. None of the above.

31. Aluminium based alloy are
    a. Single phase alloys
    b. Two phase alloys *
    c. Both (a) & (b)
    d. Neither (a) nor (b)

32. Aluminium based alloy possess ________corrosion resistance.
    a. Average b. No
    c. Poor d. Excellent *

33. Aluminium based alloy possess -------------------- ability to embed dirt.
    a. Good *
    b. Bad
    c. Average
    d. None of the above.

34. Aluminium based alloy possess.
    a. Good thermal conductivity *
    b. Bad corrosion resistance.
    c. Low coefficient of expansion
    d. None of the above.

35. Aluminium based alloy possess
    a. Low coefficient of expansion
    b. High coefficient of expansion *
    c. Low seizure resistance.
    d. None of the above.

36. Silver bearings are produced by the
    a. Electro deposition *
    b. Electro plating
    c. Electro etching
    d. None of the above.

37. Silver based alloy are ------------------- priced bearing alloys.
    a. Highest * b. Lowest
    c. Average d. None of the above.

38. Sintered bearing materials contain copper upto
    a. 50 to 52% b. 8 to 10% *
    c. 20 to 30% d. 25 to 30%

39. Sintered bearing materials contain graphite upto
    a. 1 to 3% * b. 2 to 9%
    c. 11 to 14% d.. 12 to 16%

40. Besides using bronze powder ---------------------- has also been tried for making sintered iron bearing.
    a. Iron powder * b. Zinc powder
    c. Tungsten powder d. None of the above.

41. Teflon has coefficient of friction, without lubrication
    a. £0.010 b. ³0.010
    c. £.04 * d. £.24

42. Teflon has -------------------- stability at high temperature.
    a. Poor b. Average
    c. Good * d. No

43. Fillers like glass and graphite ------------------- the resistance to deformation.
    a. Increase * b. Decrease
    c. Doesn't affect d. None of the above.

44. The self lubricating or porous bearing is made by ------------------ powdered metal and then impregnating it with oil.
    a. Sintering * b. Harden
    c. Fine d. All of the above.

45. The porous bearing contain a pore volume of between
    a. 20 to 40% b. 50 to 60%
    c. 17 to 30% * d. 32 to 35%

46. Hydrodynamic theory is applied only to the regime where there is sufficient oil to form a
    a. Continuous film *
    b. Intermittent film
    c. Porous oxide film
    d. Discontinuous film.

47. Hydrodynamic theory is limited to -------------------- where it operates well.
    a. Low bearing pressure *
    b. High bearing pressure
    c. Moderate bearing pressure.
    d. None of the above.

48. Copper lead bearings have a lead content of
    a. 40 to 45% by weight *
    b. 10 to 25% by weight
    c. 8 to 22% by weight
    d. 17 to 40% by weight.

49. Oil impregnated porous bearings should possess sufficient inter connected ---------------------- to contain and retain in use the maximum possible amount of oil.
    a. Porosity *
    b. Weldability
    c. Castability
    d. None of the above.

50. Oil impregnated porous bearings can --------------- without lubricants.
    a. Work *
    b. Not work
    c. Both (a) & (b)
    d. Neither (a) nor (b)

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CHAPTER - 26
SPRING MATERIALS

1. Springs store
   a. Mechanical energy * b. Electrical energy
   c. Thermal energy d. None of the above.

2. A good spring steel possesses
   a. High creep strength * b. Low elastic limit
   c. Low notch toughness d. Low fatigue strength

3. A good spring steel possesses high
   a. Elastic limit * b. Plastic limit
   c. Coefficient of friction d. None of the above.

4. A good spring steel possesses
   a. High notch toughness *
   b. High plastic limit
   c. Low notch toughness
   d. Low elastic limit

5. A good spring steel possesses
   a. High fatigue strength *
   b. Low fatigue strength
   c. Low notch toughness
   d. None of the above.

6. The modulus of elasticity of a good spring steel is
   a. Average b. Poor
   c. High * d. None of the above.

7. In steel piano wire carbon varies between
   a. 0.7 to 1.0% * b. 3 to 7%
   c. 3 to 9% d. 3 to 4%

8. In steel piano wire Mn varies between
   a. 1 to 1.2% b. 0.9 to 1.2%
   c. 0.3 to 0.6% * d. 0.7 to 0.9%

9. Hard drawn spring wire contain carbon
   a. 0.7 to 0.95% b. 0.5 to 0.75% *
   c. 2 to 4% d. 1 to 1.35%

10. Hard drawn spring wire contain Mn upto
    a. 0.6 to 0.9% b. 0.6 to 0.8%
    c. 0.6 to 1% d. 0.6 to 1.2% *

11. Oil hardened spring steel is used in
    a. Brushes b. Weighing machine *
    c. Crank shaft d. None of the above.

12. Cr spring steels contain V upto
    a. .07 to 0.9% b. .07 to 3%
    c. .07 to 0.12% * d. 3 to 6%

13. Stainless steel contain Cr upto
    a. 14% b. 26%
    c. 18% * d. None of the above.

14. Copper based spring materials possess
    a. High electrical conductivity *
    b. High corrosion conductivity
    c. High weight to stress ratio
    d. None of the above.

15. Copper based spring materials have --------------- magnetic properties.
    a. Good b. Average
    c. Lack of * d. None of the above.

16. Inconel contain Ni upto
    a. 80% * b. 60%
    c. 65% d. 52%

17. Inconel contain Cr upto
    a. 12% b. 14% *
    c. 20% d. 24%

18. Monel contain Nickel upto
    a. 60% b. 50%
    c. 68% * d. 76%

19. Monel contain Cu upto
    a. 19% b. 17%
    c. 20% d. 27% *

20. Z-Nickel contain Ni upto
    a. 95% * b. 85%
    c. 75% d. 65%

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CHAPTER - 27
DIE CASTING ALLOYS

1. Carburettor bodies are cast by
   a. Z-Nickel alloys b. Aluminium -Cu alloy
   c. Die casting alloys * d. Magnesium alloys

2. Zinc base alloys possess
   a. Low melting points * b. High melting points
   c. Low fluidity d. None of the above.

3. Zinc-base alloys possess
   a. Poor fluidity b. Average fluidity
   c. Good fluidity * d. None of the above.

4. Zinc - base alloys are
   a. Less castable b. Not electroplated
   c. Easy to fracture d. Easy to die cast *

5. Casting of very thin sections of Zn base alloys can
   a. Be produced *
   b. Not be produced
   c. Be produced by adding huge amount of work
   d. None of the above.

6. Zinc base alloys die has
   a. Longer life *
   b. Small life
   c. Life depends on costing method.
   d. None of the above.

7. Zinc base alloys have ------------------- for ferrous metal parts of the die and injection system.
   a. Good affinity b. Average affinity
   c. Tremendous affinity d. No affinity *

8. Zinc-Base alloys possess _________mechanical properties under normal condition.
   a. Good * b. Average
   c. Poor d. Very poor

9. Zinc base alloys are ----------------------- for use at elevated or subnormal temperatures.
   a. Not suitable * b. Suitable
   c. Only suitable d. None of the above.

10. Damp, humid or salt laden atmosphere ----------------------- corrosion in Zinc base alloys and they need special surface protection.
    a. Accelerates * b. Retards
    c. Doesn't affect d. None of the above.

11. Zinc base alloys can --------------- electroplated
    a. Be slowly b. Be readily *
    c. Not be d. None of the above.

12. Aluminium base alloys are among the ---------------- alloys.
    a. Lightest * b. Heaviest
    c. Cheapest d. None of the above.

13. Aluminium base alloys possess low melting point of
    a. 1800^{o}F b. 1600^{o}F
    c. 1400^{o}F d. 1200^{o}F *

14. Al base alloys possess ------------------- corrosion resistance.
    a. Poor b. Very poor
    c. Average d. Good *

15. Al-base alloy possess
    a. High electrical conductivity
    b. Good machinability
    c. Both (a) & (b) *
    d. Neither (a) nor (b)

16. Al-base alloys are die cast generally in ----------------------- process.
    a. Cold chamber * b. Hot chamber
    c. Both (a) & (b) d. Neither (a) nor (b)

17. Aluminium base alloys castings have ----------------------- grain structure.
    a. Fibrous b. Fine *
    c. Coarse d. None of the above.

18. Die-cast aluminium alloys possess an ultimate tensile strength of up to
    a. 2800 kg/cm^2 * b. 2200 kg/cm^2
    c. 4100 kg/cm^2 d. 3700 kg/cm^2

19. Al-base alloys are preferred where strength to weight ratios are -----------------
    a. Less b. More
    c. Average d. Critical *

20. Al-base alloys are ------------------- at extreme temperature.
    a. Stable *
    b. Not stable
    c. Stability does not depend on temperature.
    d. None of the above.

21. Copper-base alloys have tensile strength ranging from
    a. 1000 to 2000 kg/cm^2
    b. 436 to 1932 kg/cm^2
    c. 3500 to 7000 kg/cm^2 *
    d. 3000 to 4000 kg/cm^2

22. Copper base alloys possess
 a. Good corrosion resistance
 b. Good wear resistance
 c. Good machinability
 d. All of the above *

23. Copper base alloys can be satisfactorily cast with the ------------------ process, but their high melting point (1600°F to 1900°F) accompanied with high casting pressure result in die wear thus limit the life of dies.
 a. Cold chamber *
 b. Hot chamber
 c. Combustion chamber
 d. Investment casting

24. Magnesium base alloys possess good.
 a. Cracking rate b. Corrosion rate
 c. Corrosion / area ratio d. Machinability *

25. The casting temperature of Magnesium -base alloys ranges between
 a. 1200 to 2900°F b. 700 to 1200°F
 c. 1200 to 1300°F * d. None of the above.

26. Magnesium -base alloys are used in
 a. Turbine blades b. Binocular bodies *
 c. Turbine casting d. All of the above.

27. Lead -base alloy possess ------------------- casting properties.
 a. Very poor b. Bad
 c. Poor d. Excellent *

28. Lead base alloys are used where strength and weight are -----------------rather resistance to corrosion is the only consideration.
 a. Very important b. Unimportant *
 c. Less d. More

29. Lead base alloys possess low tensile strength of the order of
 a. 600 to 1000 kg/cm^2 * b. 200 to 400 kg/cm^2
 c. 300 to 900 kg/cm^2 d. 450 to 750 kg/cm^2

30. Lead base alloys are ---------------------- than Zinc base alloys
 a. Cheaper b. Costlier *
 c. Of equal cost d. Free of cost.

31. Lead base alloys are
 a. Toxic * b. Non toxic
 c. Not harmful d. None of the above.

32. A common die casting lead base alloy contain
 a. 15% Antimony * b. 30% Antimony
 c. 45% Antimony d. 60% Antimony

33. A common die-casting lead base alloy contain
 a. 15% tin b. 10% tin
 c. 5% tin * d. 20% tin

34. A common die-casting lead base alloy contains
 a. 0.5% Cu * b. 2% Cu
 c. 5% Cu d. 2.5 Cu

35. Antimony in lead base alloys
 a. Increases hardness *
 b. Decreases hardness
 c. Doesn't effect hardness
 d. None of the above.

36. Lead base alloys are used in
 a. Binocular bodies b. Radiation shielding *
 c. Camera bodies d. All of the above.

37. Tin base die casting alloys contain
 a. Sb, Cu, Pb * b. Sb, Cast Iron, Al
 c. Ni, Cr, Ag d. Au, Ag, Cr

38. Lead base alloys have
 a. Low melting point * b. High melting point
 c. Melting point at 323°C d. None of the above.

39. In case of tin base alloy, it is possible to obtain __________degree of accuracy associated with high production rates.
 a. High * b. Low
 c. Equal d. Zero

40. With tin base alloys, wall thickness as small as _________can be cast
 a. 0.2 mm b. 2 mm
 c. 0.4 mm * d. 0.9 mm

41. Tin base alloys have
 a. High prime cost *
 b. Low prime cost
 c. Good mechanical properties
 d. None of the above.

42. Tin base alloys contain lead upto
 a. 19% * b. 27%
 c. 31% d. 30%

43. Tin base alloys contain antimony between
 a. 9 to 27% b. 4 to 16% *
 c. 20 to 30% d. 15 to 25%

44. Tin base alloys are used to produce
 a. Small castings * b. Large castings
 c. Both (a) & (b) d. Neither (a) nor (b)

45. Tin base alloys are also known as
 a. Ceremets b. Babbit metal *
 c. Organic metal d. None of the above.

46. Low cost jwellery is made by
 a. Cast Irons b. Alloy steels
 c. Tin base alloys * d. Copper tungsten alloys

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CHAPTER - 28
MAGNETIC MATERIALS

1. Iron Nickel & cobalt are
   a. Non magnetic b. Toxic material
   c. Magnetic but poor d. Highly magnetic *

2. Iron, Nickel, cobalt have an ------------------ capacity for concentrating the magnetic lines of force.
   a. Extremely high * b. Extremely low
   c. Average d. None of the above.

3. Iron, Nickel & Cobalt can be turned into powerful magnets and are known as
   a. Ferromagnetic * b. Paramagnetic
   c. Diamagnetic d. None of the above.

4. The metal containing small elementary magnetic region termed as
   a. Domain * b. Dipole
   c. Magnetic pole d. None of the above.

5. Ferromagnetism is a result of the ------------------- within atoms.
   a. Electron structure *
   b. Grain structure
   c. Grain boundary structure
   d. All of the above.

6. Mg, Al, V, Cr, Mo & W are ------------------- material.
   a. Paramagnetic * b. Ferromagnetic
   c. Diamagnetic d. None of the above.

7. Cu, Ag, Sb, Bi are --------------------- material.
   a. Paramagnetic
   b. Ferromagnetic
   c. Diamagnetic *
   d. None of the above.

8. Soft magnetic materials are --------------------- materials.
   a. High permeability *
   b. Low permeability
   c. Very poor permeability
   d. None of the above.

9. Soft magnetic materials have
   a. Low hysterisis losses *
   b. High hysterisis losses.
   c. High coercive force
   d. None of the above.

10. Soft magnetic materials have
   a. High coercive force.
   b. Low coercive force *
   c. Low permeability.
   d. High hysterisis losses.

11. Soft magnetic materials are ------------------- to magnetise
   a. Easy *
   b. Difficult
   c. Depends on magnetic field
   d. None of the above.

12. Soft magnetic materials loose their magnetism
   a. At very high pressure
   b. After a long time
   c. Very quickly *
   d. None of the above.

13. A soft magnetic material must have a
   a. Binary structure.
   b. Hetrogeneous structure
   c. Homogeneous structure *
   d. None of the above.

14. A soft magnetic material must be free of
   a. Electric charge b. Internal stresses *
   c. Residual stresses d. None of the above.

15. Pure Iron is a
   a. Soft magnetic material *
   b. Hard magnetic material.
   c. Ferrite.
   d. All of the above.

16. In Iron silicon alloys, addition of silicon to Iron increases the
   a. Electrical resistivity *
   b. Electrical conductivity
   c. Cracking phenomenon
   d. None of the above.

17. Soft iron Nickel alloys are ------------------- over Iron-Si alloys for use in communication equipment for high sensitivity and fidelity
   a. Less used b. Not used
   c. Preffered * d. None of the above.

18. Ferrite is a
   a. Soft magnetic material *
   b. Hard magnetic material
   c. Both (a) & (b)
   d. Neither (a) nor (b)

19. Ferrite find use in
   a. High frequency field *
   b. Low frequency field.
   c. Very poor frequency field.
   d. None of the above.

20. Ferrite possesses
    a. Minimum relative permeability.
    b. Maximum relative permeability *
    c. Zero relative permeability.
    d. None of the above.

21. Resistivity for ferrites is (P)
    a. 0.1 b. 0.2 *
    c. 0.3 d. 0.4

22. A hard magnetic material has
    a. Low Coercive force.
    b. High coercive force *
    c. Low saturation of magnetization.
    d. None of the above.

23. Alnicos contain
    a. Al, Ni, Co and Fe * b. Al, Zn, Ag and Au
    c. Al, Zn, Sb, Ni d. None of the above.

24. The permanent magnetic properties are produced by ----------------- and by severe cold working.
    a. Case hardening
    b. Nitriding
    c. Precipitation hardening *
    d. Carburizing

25. Sintered powder magnets are made by sintering pressed metal powders at -------------------- temperature using powder metallurgy.
    a. High * b. Low
    c. 740°C d. 900°C

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CHAPTER - 29
PRECIOUS METALS

1. Precious metals are also known as
   a. Costly metals b. Noble metals *
   c. Idealmetals d. None of the above.

2. Pure silver has the -------------------- thermal & electrical conductivity.
   a. Highest * b. Lowest
   c. Average d. Zero

3. Pure silver have the highest
   a. Cost b. Brittleness
   c. Optical reflectivity * d. None of the above.

4. Pure silver is ------------------- metal.
   a. Ductile * b. Brittle
   c. Not a malleable d. All of the above.

5. Silver possesses
   a. Good corrosion resistance
   b. Good ductility
   c. Both (a) & (b) *
   d. Neither (a) nor (b)

6. Sterling silver contain copper upto
   a. 10.5% b. 12%
   c. 9.5% d. 7.5% *

7. Coin silver contain copper upto
   a. 20% b. 15%
   c. 10% * d. 7%

8. Silver -copper eutectic contain copper upto
   a. 14% b. 28% *
   c. 32% d. 36%

9. Silver brazing alloy contain silver upto
   a. 5 to 14% b. 30 to 70%
   c. 10 to 85% * d. 10 to 25%

10. ------------------ oxidizes slowly in air
    a. Silver * b. Stainless steel
    c. Nickel steel d. None of the above.

11. Gold is the ------------------ ductile of all metals.
    a. Most * b. Lowest
    c. Average d. None of the above.

12. Gold possesses
    a. High oxidation resistance *
    b. Low chemical resistance.
    c. Brittleness
    d. None of the above.

13. ----------------- is yellow, soft and soluble in aqua regia and cyanide solution.
    a. Gold * b. Copper
    c. Brass d. Bronze

14. Gold is attacked by chlorine at temperatures above.
    a. 150°C b. 100°C
    c. 130°C d. 80°C *

15. For most cases, gold is alloyed to increase
    a. Hardness * b. Brittleness
    c. Colour aspects d. None of the above.

16. The corrosion resistance and ------------------- also make gold useful in brazing alloy.
    a. High melting point b. Low melting point *
    c. High Brittleness d. None of the above.

17. Platinum is a ------------------- metal.
    a. Ductile *
    b. Brittle
    c. Extremely Brittle
    d. Blue, corrosion resistance.

18. In platinum, Iridium is added to improve
    a. hardness b. brittleness
    c. ductility d. corrosion resistance *

19. Palladium is a ------------------ metal.
    a. Silvery white * b. Yellow & Ductile
    c. Brittle & Grey d. None of the above.

20. Palladium is slightly ------------------- than platinum.
    a. Softer b. Harder *
    c. Corrosion resistance d. None of the above.

21. --------------------- have highest electrical resistivity in platinum group.
    a. Palladium * b. Iridium
    c. Rhodium d. Ruthenium

22. Palladium begins to tarnish at temperatures above.
    a. 400°C * b. 800°C
    c. 1200°C d. 1100°C

23. When Palladium is used as a alloying element it improves ------------------ without lowering corrosion resistance
    a. Hardness & ductility
    b. Hardness & solubility
    c. Hardness & strength *
    d. None of the above.

24. Iridium is the most ------------------- metallic element known
    a. Corrosion resistant * b. Cheapest
    c. Ductile d. Soft

25. Iridium has high temperature strength comparable to tungsten upto.
    a. 3250°C b. 2700°C
    c. 2250°C d. 1650°C *

26. Rhodium is the -------------------- metal.
    a. Hardest * b. Softest
    c. Cheapest d. None of the above.

27. Rhodium possesses highest
    a. Electrical conductivity.
    b. Thermal conductivity.
    c. Both (a) & (b) *
    d. Neither (a) nor (b)

28. Ruthenium possesses
    a. Softness b. Brittleness *
    c. Ductility d. None of the above.

29. Ruthenium tetraoxide is very volatile and
    a. Soft b. Poisonous *
    c. Harmless d. None of the above.

30. Ruthenium is added to platinum to increase
    a. Resistivity b. Hardness
    c. Both (a) & (b) * d. Neither (a) nor (b)

31. The melting point of Osmium is
    a. 3200°C b. 3900°C
    c. 2000°C d. 2700°C *

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CHAPTER - 30
METALS FOR NUCLEAR ENERGY

1. Uranium is a
   a. Liquid fuel b. Nuclear fuel *
   c. Carbon fuel d. None of the above.

2. Uranium is denoted by
   a. U^{239} b. U^{231}
   c U^{235} * d. U^{335}

3. Natural uranium consists essentially of two isotopes
   a. U^{231} and U^{233} b. U^{235} and U^{239}
   c U^{235} and U^{238} * d. U^{233} and U^{237}

4. Uranium is very reactive, easily ---------------------- and exists in three allotropic forms.
   a. Oxidised * b. Carburised
   c. Deoxidised d. None of the above.

5. Uranium Oxide is highly --------------------
   a. Corrosive
   b. Refractory *
   c. Both (a) & (b)
   d. Neither (a) nor (b)

6. Uranium oxide has melting point of
   a. 2000°C b. 2400°C
   c. 1800°C d. 2880°C *

7. Uranium oxide has density of
   a. 9.25 gm/cc b. 10.97 gm/cc *
   c. 2.83 gm/cc d. 6.57 gm/cc

8. Uranium oxide possesses
   a. Low melting temperature about 800°C
   b. High resistance to corrosion *
   c. Low resistance to corrosion
   d. None of the above.

9. Pure uranium is
   a. Very hard b. Hard
   c. Weak * d. High corrosion resistant

10. Pure Uranium possess
    a. High hardness
    b. Poor resistance to corrosion *
    c. High resistance to corrosion
    d. All of the above.

11. Plutonium is a
    a. oxide fuel
    b. liquid fuel
    c. Simplediluted Nuclear fuel
    d. Concentrated nuclear fuel *

12. Plutonium is ---------------------- in nature.
    a. Found b. Not found *
    c. Depends on quality d. None of the above.

13. Plutonium is produced from
    a. U^{231} b. U^{233}
    c U^{237} d. U^{238} *

14. The melting point of plutonium is
    a. 700°C b. 900°C
    c. 1700°C d. 640°C *

15. Plutonium is
    a. Not harmful b. Not reactive
    c. Highly toxic * d. None of the above.

16. Plutonium exists in ---------------------- allotropic forms
    a. Only two b. Seven
    c. Only three d. Six *

17. Plutonium possess
    a. Good corrosion resistance.
    b. Poor corrosion resistance *
    c. High melting point above 2500°C.
    d. None of the above.

18. Plutonium is used for making
    a. Atomic bombs * b. Airframes
    c. Turbine bearings d. None of the above.

19. Thorium is a ---------------------- metal.
    a. F.C.C. * b. B.C.C
    c. H.C.P d. None of the above.

20. Pure thorium is a _________metal.
    a. Hard b. Very hard
    c. Soft * d. Hardest

21. Pure thorium is a -------------- material.
    a. Radio-active b. Weak
    c. Both (a) & (b) * d. Hardest

22. 0.2% addition of C raises its ------------------- to a good extent.
    a. Tensile strength * b. Compressive strength
    c. Softness d. None of the above.

23. Uranium when added to thorium increases its
    a. Internal stresses
    b. Strength *
    c. Softness
    d. Corrosion resistance.

24. When Ti & Zr added to thorium, ---------------------- the strength & hardness.
a. Increases
b. Decreases *
c. Doesn't affect hardness
d. Increases softness

25. Thorium is ------------------ susceptible to irradiation damage.
a. Less * b. More
c. Average d. Not

26. Beryllium has a --------------------- crystal structure.
a. F.C.C. b. H.C.P. *
c. B.C.C d. None of the above.

27. Beryllium has melting point at
a. 1183ºC b. 1177ºC
c. 1283ºC * d. 1277ºC

28. Beryllium's density is
a. 1.85 gms/cm^3 * b. 2.85 gms/cm^3
c. 3.85 gms/cm^3 d. 2.24 gms/cm^3

29. Beryllium has a hardness of
a. 209 V.H.N. b. 109 V.H.N. *
c. 99 V.H.N. d. 107 V.H.N.

30. Beryllium is used as
a. Moderator b. Reflector
c. Both (a) & (b) * d. Neither (a) nor (b)

31. Beryllium is ------------------ reactive metal.
a. Less b. Average
c. Poor d. Very good *

32. Cast beryllium is usually
a. Coarse grained * b. Fine grained
c. Fibrous d. None of the above.

33. Cast Beryllium is ----------------- in nature.
a. Ductile b. Brittle *
c. Fine grained d. None of the above.

34. Billets of Beryllium are produced by using --------------- techniques.
a. Blending b. Crushing
c. Casting d. Powder metallurgy *

35. Pure Beryllium oxidizes fairly rapidly at temperature over about
a. 760ºC * b. 860ºC
c. 960ºC d. 460ºC

36. Niobium has a ----------------- structure.
a. F.C.C b. B.C.C *
c. H.C.P d. None of the above.

37. Niobium has melting point of
a. 2068ºC b. 2168ºC
c. 2368ºC d. 2468ºC *

38. Niobium possesses
a. Good strength * b. Poor strength
c. Average strength d. Good Brittleness

39. Niobium possesses
a. Ductility *
b. Brittleness
c. Bad corrosion resistance
d. Both (a) & (b)

40. Niobium possess ------------- corrosion resistance especially to liquid sodium coolants.
a. Poor b. Very Poor
c. Average d. Good *

41. Niobium has ------------------ compatibility with uranium.
a. Poor b. Less
c. Average d. Excellent *

42. Density of Niobium is
a. 7.6 gms/cm^3 b. 8.6 gms/cm^3 *
c. 9.6 gms/cm^3 d. 10.6 gms/cm^3

43. Hardness of niobium is ------------------- V.H.N.
a. 80 b. 60
c. 40 * d. 20

44. Oxidation resistance of Niobium to about ---------------------- can be improved by alloying.
a. 600ºC b. 400ºC *
c. 800ºC d. 963ºC

45. Zirconium has a
a. H.C.P. Structure b. B.C.C. Structure
c. F.C.C. Structure d. Both (a) & (b) *

46. Zirconium's Melting point is
a. 1852ºC * b. 1823ºC
c. 1810ºC d. 1892ºC

47. Density of Zirconium is ---------------------gms/cm^3.
a. 6.55 * b. 2.35
c. 4.37 d. 9.32

48. Hardness of Zirconium is ------------------ V.H.N.
a. 670 b. 320
c. 140 * d. 280

49. Zirconium has a relatively ------------------- resistance to CO_2 at high temperatures.
a. Good b. Very good
c. Excellent d. Poor *

50. Addition of 0.5% Cu in zirconium, raises tensile strength and improves creep resistance at
a. 450ºC * b. 650ºC
c. 850ºC d. 750ºC

■■■

CHAPTER - 31
NON - FERROUS LIGHT ALLOYS

1. With aluminium as base metal if copper 4.5% and magnesium, manganese and silicon of 0.7% added, it becomes.
   a. Alclad b. Duralumin *
   c. Alpax d. 'Y' alloy

2. If duralumin sheet is coated with pure aluminium it becomes alclad and is used for
   a. Aircraft sheets
   b. Fuselage and wing coverings
   c. Under carriage hubs
   d. a. and b. are correct *

3. Aluminium with 13% silicon and minor % of iron, manganese and zinc, it becomes
   a. Alpax
   b. Excellent casting metal
   c. Fair corrosion and heat resistant
   d. All above *

4. 'Y' alloy is basically aluminium alloy with
   a. Copper 4.5% b. Nickel 2.3 %
   c. Magnesium 1.7 % d. All above *

5. Pistons and cylinder heads are made of
   a. Duralumin b. 'Y' alloy *
   c. Alpax d. Alclad

6. Hiduminium is a aluminium alloy with copper, nickel, magnesium iron and silicon and is
   a. as strong as mild steel
   b. used for cylinder heads and pistons
   c. used for aircraft structural parts
   d. all above are correct *

7. Elektron is basically a magnesium alloy with aluminium 11%, zinc 3.5% and manganese 2.5 %. It:
   a. becomes very light
   b. is fairly corrosion resistant
   c. may be cast and wrought
   d. posses all above properties *

8. Electron is used to manufacture
   a. crank cases b. fuel and oil tanks
   c. aircraft landing wheels d. all above *

■■■

CHAPTER - 32
NON - FERROUS : HEAVY ALLOYS

1. The constituents of brass are
   a. Copper and tin
   b. Copper and zinc *
   c. Copper and lead
   d. None of the above

2. Since brass is good wearing, anti - friction and corrosion resistance, it is used for :
   a. Lightly stressed casting
   b. Pipe fittings and fitter gauges
   c. Bearing bushes
   d. All above *

3. The properties of bronze are more or less like brass, but is usually used only to make
   a. Pipe fitting
   b. Filter gauges
   c. Bearing bushes *
   d. Lightly stressed casting

4. If 1% of phosphorus is added with copper and tin, it becomes phosphor bronze and becomes
   a. Weaker then bronze
   b. Stronger than bronze
   c. Very strong and with stands heavy loads
   d. As per b. and c.*

5. Solder is made out of tin and lead and have low melting point. It is used for
   a. Hard soldering
   b. Brazing
   c. Soft soldering *
   d. None of the above

6. The constituents of tungum are
   a. Copper, zinc
   b. Aluminium, nickel and silicon
   c. None of the above
   d. a. and b. are correct *

7. Radiator matrix are generally made from
   a. Brass
   b. Bronze
   c. Tungum *
   d. Phosphor bronze

8. White metal used for bearings is made from bronze, antimony and small % of nickel and have specific quality to melt at low temperatures
   a. to lubricate the bearing surfaces
   b. to prevent bearing seizure *
   c. to cool the overheated bearing
   d. None of the above

9. The lead bronze is made with copper, lead and small quantity of zinc, tin and nickel is used for bearings. It posses:
   a. High thermal conductivity
   b. Better mechanical strength
   c. Property to avoid over heating
   d. All above properties *

■■■

CHAPTER - 33
TITANIUM ALLOYS

1. Titanium alloy is a
   a. high density alloy
   b. low density metallic element *
   c. medium density element
   d. none of the above

2. The element is extracted from
   a. rutile
   b. ilmenite
   c. both a. & b. *
   d. none of the above

3. What are the process using extracting titanium
   a. kroll process
   b. hunter process
   c. both a. & b. *
   d. none of the above

4. The reduction product is a porous, spongy material known as
   a. titanium porous
   b. titanium sponge *
   c. titanium alloy
   d. all of the above

5. Titanium sponge is converted to titanium metal by
   a. sequence of consumable melting operations *
   b. forming
   c. both a. & b. correct
   d. both a. & b. are wrong

6. Compared to common metals iron, copper, aluminium with titanium is
   a. more expansive *
   b. less expansive
   c. both are wrong
   d. found from iron ore

7. Jet engine contains upto
   a. 20% titanium alloy
   b. 30% titanium alloy *
   c. 40% titanium alloy
   d. 50% titanium alloy

8. Airframe structure contains at least
   a. 20% titanium
   b. 50% titanium
   c. 60% titanium *
   d. 90% titanium

9. Advantage of titanium alloy is
   a. strength to weight ratio
   b. usable at elevated temperature
   c. corrosion resistance
   d. all of the above *

10. Titanium alloy has
    a. lower thermal conductivity *
    b. higher conductivity
    c. no effect
    d. all of the above

11. Elastic modulus of titanium is also intermediate between
    a. aluminium & iron
    b. aluminium & steel *
    c. cast iron & steel
    d. cast iron & aluminium

12. Titanium alloy has
    a. lower thermal conductivity
    b. lower thermal expansion
    c. both a. & b. *
    d. none of the above

13. Electrolytic reduction process works as
    a. kroll process
    b. dow howmet process *
    c. huanter process
    d. all of the above

14. Titanium has
    a. rigidth to weight ratio *
    b. weight to straingh ratio
    c. both a. & b.
    d. none of the above

15. Advantage of titanium alloy is
    a. high rigidity to weight ratio
    b. good fatique strength
    c. toughness
    d. all of the above *

16. Main advantage of titanium alloy is
    a. high corrosion resistance *
    b. high tensile strength
    c. high shear strength
    d. all of the above

17. Growth of oxide film in titanium is
    a. very fast
    b. very slow at room temperature *
    c. intermediate rate
    d. very very fast

18. At very high temperature and in molten state the titanium being highly reactive and
    a. hydrogen get dissolved
    b. nitrogen get dissolved
    c. oxygen get dissolved *
    d. carbon get dissolved

19. Titanium at low concentration rate the metal without significantly loss in
    a. ductility *
    b. Malleabieing
    c. strength
    d. stress

20. Titanium at high concentration rate the metal leads
    a. iron embrittlement
    b. lead embrittement *
    c. zinc embrittement
    d. all of the above

21. Titanium melting & welding with specialized techniques and carried out in
    a. atmosphere
    b. vaccum *
    c. water
    d. steel

22. Which of the following gas is required to do melting & welding the titanium
    a. argon *
    b. oxygon
    c. hydrogen
    d. all of the above

23. Titanium alloys are used in A/C as
    a. blades *
    b. structures
    c. landing gear
    d. gears

24. The weight of F-15 is
    a. 40 wt%
    b. 35 wt% *
    c. 50 wt%
    d. 55 wt%

25. If atoms do not attract each other
    a. all matter would have vapour *
    b. all matter would have liquid
    c. all matter would have solid
    d. all matter would have semiconductors

26. Titanium is
    a. allometric
    b. allotropic *
    c. isotropic
    d. all of the above

27. The HCP structure is called alpha(α) and Pure titanium at temperature upto
    a. 800^0C b. 815^0C
    c. 882^0 C * d. 900^0C

28. The transformation to body centered cubic crystal structure called
    a. alpha b. beta *
    c. both d. none of the above

29. This transformation of alpha to beta in pure titanium results in slight
    a. expansion *
    b. decreases ductility
    c. both a. & b.
    d. none of the above

30. Transformation is accomplished by a concentration in atomic diameter this phenomenon is
    a. concentration
    b. goldschmidt concentration *
    c. both a. & b.
    d. none of the above

31. The temperature at which the transformation of alpha to beta occur in pure titanium to as the
    a. alpha transus
    b. gamma transus
    c. beta transus *
    d. all of the above

32. In the western Hemisphere the aerospace industry makes up for 65% of total titanium consumption in the form of
    a. bloom
    b. bar
    c. wires
    d. all of the above *

33. Pure titanium is referred to as the
    a. beta transus *
    b. alpha transus
    c. gamma transus
    d. all of the above

34. Titanium coming under
    a. superior element
    b. transition element *
    c. both a. & b.
    d. none of the above

35. Titanium is a member of the group element called the
    a. inter structure element
    b. transition element *
    c. negative element
    d. positive element

36. Titanium has
    a. high tensile strength
    b. high cohesive strength *
    c. both a. & b.
    d. none of the above

37. Substitutional alloying diameter ratio is between
    a. 60 - 70%
    b. 85 - 115% *
    c. 90 - 95%
    d. 30 - 40%

38. The alloying element are less than 0.6 times the diameter of titanium alloying element are coming under
a. crystal interstitially *
b. crystalizing
c. instability
d. stability

39. Atomic diameter less than 0.6 diameter of titanium are
a. carbon
b. nitrogen
c. hydrogen
d. all of the above *

40. Pure titanium is very
a. tensile
b. ductile *
c. malleable
d. elasticely

41. Titanium is more useful when its
a. strength is decreased
b. does not effect strength
c. strength is increased *
d. stress increased

42. Such elements which have no significant effect on transformation temperature are called
a. positive
b. neutral *
c. negative
d. all of the above

43. Disappears range of titanium are
a. 260^0 C - 425^0 C *
b. 250^0 C - 400^0 C
c. 200^0 C - 300^0 C
d. 150^0 C - 300^0 C

44. When alpha stabilizer added to titanium the temperature will be
a. decreased
b. increased *
c. no effect
d. none of the above

45. Alpha stabilizers include C, O & N whose strengthening effect dissappears in the range of
a. 260^0 C to 425^0 C * b. 300^0 C to 400^0 C
c. 150^0 C to 250^0 C d. 100^0 C to 300^0 C

46. Pure titanium has very
a. high strength b. low strength *
c. medium strength d. none of the above

47. The element that promote lower transformation temperature are called
a. alpha stabilizer b. beta stabilizer *
c. both a. & b. d. none of the above

48. Strengthening effect of Al presists to about
a. about 500^0 C
b. about 400^0 C
c. about 538^0 C *
d. about 430^0 C

49. The intermediate form of titanium is
a. Ti_3Al *
b. Ti_2C
c. Ti_3Al
d. Ti_4Al_2

50. For addition upto 8% Al there is
a. sharp drop indicating
b. sharp ductility indicating *
c. both a. & b.
d. none of the above

51. High toughness alloys of titanium are referred as
a. extra low interstitials *
b. extra high interstitials
c. low interstitials
d. all of the above

52. Elements constituting beta is amorphous stabilization system are
a. vanadium
b. molybdenum
c. tantalum
d. all of the above *

53. Under equilibrium condition the beta phase decomposes to form
a. inter metallic compound *
b. intermolecular compound
c. interfere molecule
d. all of the above

54. Beta eutectoid element arranged in order of increasing tendency to form
a. element
b. compound *
c. atom
d. all of the above

55. Chromium, iron & manganese are not generally used in sufficient quantity to form
a. compound *
b. element
c. atom
d. all of the above

56. Which of the alloying element stabilises β elements
a. nitrogen b. hydrogen *
c. oxygen d. all of the above

57. Elements constituting beta isomorphous stabilisation system are
a. vanadium b. molybdenum
c. tantalum d. all of the above *

58. Under decomposes beta phase to form and a
    a. intermetallic compound *
    b. element
    c. atom
    d. all of the above

59. Titanium crystal does not improve the properties of titanium rather its process of
    a. nitrogen
    b. hydrogen *
    c. oxygen
    d. nitro alloys

60. Minimizing the hydrogen content through vaccum or controlled atmosphere processing and use of strongly
    a. carbonizing pickling
    b. oxidizing pickling *
    c. neutralizing pickling
    d. all of the above

61. Hydrogen normally may still be present in titanium in quantities upto
    a. 400 PPM
    b. 100 PPM
    c. 200 PPM *
    d. 500 PPM

62. At low temperature the phase shows no solubility of hydrogen in
    a. alpha *
    b. beta
    c. combine
    d. all of the above

63. Hydrogen is appreciable in
    a. beta
    b. combined
    c. alpha *
    d. all of the above

64. Beta phases contain
    a. nitrogen
    b. hydrogen *
    c. oxygen
    d. all of the above

65. Minimizing the hydrogen content by
    a. strongly oxidizing pickling medium *
    b. carburizing medium
    c. both a. & b.
    d. none of the above

66. The addition of hydrogen lowers the beta transus to the eutectoid temperature of about
    a. 200^0C b. 300^0C *
    c. 400^0C d. 500^0C

67. In hydrogen embrittlement at low temperature no solubility of hydrogen in
    a. alpha b. beta *
    c. combined d. all of the above

68. Though the effects of hydrogen are complex its embrittling effect can be observed under varying conditions of
    a. stress *
    b. strain
    c. shear
    d. tensile

69. At lower temperature titanium loses
    a. malleability
    b. ductility *
    c. compressibility
    d. all of the above

70. At the low temperature a titanium hybride phase can be
    a. precipitated *
    b. decomposes
    c. both
    d. none of the above

71. Two types of hydrogen embrittlement
    a. impact
    b. strain aging
    c. both a. & b. *
    d. none of the above

72. Addition of hydrogen increases
    a. tolerance of alpha alloys *
    b. tolerance of beta alloys
    c. both
    d. none of the above

73. The addition of 7% Al raises the hydrogen content necessary to cause embrittlement from
    a. 55 PPM - 300 PPM
    b. 55 PPM to more than 300 PPM *
    c. both a. & b.
    d. none of the above

74. This improvement is attributed to the solubility of hydrogen in the beta phase of the
    a. Ti - 2% Mo alloy *
    b. Ti - 30% Mo alloy
    c. Ti - 4% Mo alloy
    d. none of the above

75. Alpha-betal alloys are not susceptible to
    a. only one type of hydrogen embrittlement
    b. two types *
    c. none
    d. either a or b

76. Alpha-betal alloys are not susceptible to
    a. Ti - 8% Mn * b. Ti - 7% Mn
    c. Ti - 6% Mn d. Ti - 5% Mn

77. Control hydrogen to lower lower levels is the workable solution to avoid
    a. concentration b. embrittlement *
    c. addition d. all of the above

78. The last group of alloying element is known as
a. neutral element *
b. positive element
c. negative element
d. all of the above

79. Tin & Zirconium are very effective is
a. α – phase
b. β - phase
c. both a. & b. *
d. none of the above

80. The composition of α–alloy is such that the solute element raise the
a. $\alpha / \alpha + \beta$
b. $\alpha + \beta / \beta$
c. both *
d. none of the above

81. Alfa alloys are
a. heat treatable *
b. non-heat treatable
c. both a. & b.
d. none of the above

82. CP titanium grades are used in application where optimum corrosion resistance is desired where
a. low strength is not a factor
b. high strength is not a factor *
c. both a. & b.
d. none of the above

83. The predominant alloying element in alpha titanium alloys is
a. aluminium *
b. magnesium
c. both
d. titanium

84. ELI stands for
a. extra low interstitial *
b. excess local interstitial
c. both are wrong
d. both are correct

85. Titanium grades are used for
a. exhaust shrouds
b. brackets
c. tail cones
d. all of the above *

86. The HCP allotrope have excellent resistance to
a. temperature *
b. pressure
c. volume
d. all of the above

87. Highest creep resistance has
a. HHL allotrope
b. HCP allotrope *
c. HCL allotrope
d. all of the above

88. These alloys also exploit the superior creep resistance of the α -phase particullary when alloyed with
a. titanium
b. hydrogen
c. silicon
d. all of the above *

89. β -processed alloys exhibit better
a. creep & fracture toughness *
b. malleability
c. ductility
d. all of the above

90. $\alpha + \beta$ alloys contain substantial amount of a
a. malleability magnesium
b. aluminium *
c. both a. & b.
d. none of the above

91. The alloys are so formulated that both the hexagonal α –phase and BCC β -phase co-exist at
a. room temperature *
b. above the room temperature
c. below the room temperature
d. none of the above

92. The variety of properties that can be achived in
a. α -alloys
b. β -alloys
c. α–β alloys *
d. none of the above

93. 'A' stands for
a. annealed * b. heat treated
c. hardening d. tempaing

94. DA stands for
a. heat treated
b. duplex annealed *
c. tempering
d. hardnening

95. STA stands for
a. annealed
b. solution treated & age hardened *
c. solution heat treated

96. The α stabilizing interstial element C, O & N increase the strength but
a. decrease the ductility *
b. decrease the malleability
c. decrease the elasticity
d. none of the above

97. ELI stands for
   a. electric landing instrument
   b. extra low interstitials *
   c. excess low intensities
   d. none of the above

98. The beta stabilizing system may be classified into
   a. beta isomorphous
   b. beta entectoid
   c. both a. & b. *
   d. none of the above

99. Increasing the alloying contents
   a. decreases the alpha to beta transformation *
   b. increases the alpha to beta transformation
   c. no effect the alpha to beta transformation
   d. none of the above

100. Elements constituting beta isomorphous stabilisation system are
   a. vanadium
   b. molybdenum
   c. tantalum
   d. all of the above *

101. The sluggish eutectoid formers are
   a. chromium
   b. iron
   c. manganese
   d. all of the above *

102. Which one of the element that stabilises β -in titanium alloys & occupies interstitial of titanium crystal
   a. nitrogen
   b. hydrogen *
   c. oxygen
   d. carbon

103. Hydrogen is a element which
   a. improve the properties
   b. do not improve the properties *
   c. act as a catalyst
   d. none of the above

104. The addition of hydrogen lower the beta transus to the eutectoid temperature of about
   a. 200^0 C
   b. 400^0 C
   c. 300^0 C *
   d. 500^0 C

105. At low temperature the hydrogen is
   a. soluble in alpha
   b. not soluble in alpha *
   c. soluble in beta-alpha
   d. not soluble in beta

106. Hydrogen is soluble in
   a. alpha b. alpha-beta
   c. beta * d. none of the above

107. Hydrogen embrittlement is most pronounced at room and lower temperature where it causes loss in
   a. malleability
   b. ductility *
   c. elasticity
   d. all of the above

108. At the low temperature the titanium hydride phase can also
   a. decomposes
   b. ϕ oxidized
   c. precipitate *
   d. all of the above

109. The different types of hydrogen embrittlement are
   a. impact *
   b. stress
   c. both
   d. none of the above

110. The two types of hydrogen embrittlements are
   a. impact
   b. strain
   c. both *
   d. none of the above

111. Impact embrittlement results from the presence of a
   a. hydride
   b. embrittlement
   c. both *
   d. none of the above

112. The addition of 7% Al raises the hydrogen content necessary to cause embrittlement from
   a. 55 PPM to more than 300 PPM *
   b. 700 PPM - 800 PPM
   c. 800 PPM - 900 PPM
   d. 900 PPM - 1000 PPM

113. A small additions of beta stabilisers increases the
   a. carbon tolerances b. hydrogen *
   c. both a. & b. d. none of the above

114. 2% Mo addition appreciably increases the tolerance if
   a. carbon b. hydrogen *
   c. oxygen d. nitrogen

115. The improvement is attributed to the high solubility of hydrogen in the beta phase of the
   a. Ti - 2% Mo alloy *
   b. Ti - 4% Mo alloy
   c. Ti - 1% Mo alloy
   d. Ti - 3% Mo alloy

116. Alpha-beta type alloys may be susceptible to
   a. impact type embrittlement
   b. strain type embrittlement
   c. both *
   d. none of the above

117. $\alpha+\beta$ alloys are not as susceptible to this hydrogen embrittlement as the
a. Ti - 8% Mn alloy *
b. Ti - 6% Mn alloy
c. Ti - 4% Mn alloy
d. Ti - 2% Mn alloy

118. Hydrogen content were accordingly established at
a. 100 - 200 PPM
b. 125 - 200 PPM *
c. 150 - 250 PPM
d. 50 - 300 PPM

119. During deformation the hydrogen concentration progressively
a. increases in the beta phase *
b. decreases in the beta phase
c. none of the above
d. all of the above

120. Hot working even in aluminide based alloy is carried out in the
a. β
b. $\alpha+\beta$
c. both a. & b. *
d. none of the above

121. Tin & zirconium are very effective alloying elements since they have extensive solid solubility
a. α -phases
b. β -phases
c. both phases *
d. none of the above

122. Aerospace titanium alloys are divided into how many classes
a. two b. three
c. four d. five *

123. Aerospace titanium alloys are divided
a. α -alloys b. β -alloys
c. $\alpha+\beta$ alloys d. all of the above *

124. Composition of IMI 115-160
a. Ti + 0 *
b. Ti - 5AI - 2
c. Ti - 6AI - 25n
d. all of the above

125. Composition of Ti -10-2-3
a. Ti + 0 *
b. Ti - 10V - 2Fe - 3AI
c. Ti - 15V - 3Cr - 35n - 3AI
d. none of the above

126. BT-9 consists of
a. Ti - 6.5AI - 3.3Mo - 1.5Zr - 0.3Si *
b. Ti + 0
c. Ti - 15V - 3Cr - $3s_n$ - 3AI
d. Ti - 5AI - 2

127. Upper part of the fatigue indicates composition range of
a. two class of titanium alloy
b. three class of titanium alloy
c. four class of titanium alloy
d. five class of titanium alloy *

128. α -alloys are
a. heat treatable
b. non heat treatable *
c. normalizing
d. case hardning

129. Specified grade of titanium contain
a. 99.01 - 99.5% titanium *
b. 75.05 - 80.09% titanium
c. 60.05 - 70.05% titanium
d. 50.05 - 60.06% titanium

130. Small amounts of which of the following elements present in titanium alloy
a. carbon
b. hydrogen
c. nitrogen
d. all of the above *

131. Which of the element present in titanium to affect the properties
a. oxygen *
b. H_2SO_4
c. hydrochloric
d. none of the above

132. Oxygen functions in titanium alloy
a. controlled strengthener *
b. hardness
c. brittleness
d. malliability

133. CP stand for
a. circular pitch
b. commercially pure *
c. common pitch
d. all of the above

134. The HCP allotrope of titanium have high resistance to
a. creep *
b. vibration
c. malliability
d. ductility

135. The group containing largest number of commercial alloys accounting for more than
a. 30% b. 60%
c. 70% * d. 90%

136. Hot deformation in $\alpha+\beta$ alloys can be accomplished in
a. α fieldb. β field *
c. $\alpha+\beta$ field d. none of the above

137. A range of α/β volume fraction can be obtained depending on
   a. pressure
   b. volume
   c. temperature *
   d. all of the above

138. The solubility of β -phase present is also dependant on
   a. volume
   b. temperature *
   c. type of alloy
   d. all of the above

139. Solute rich β produced by processing with $\alpha+\beta$ at
   a. atmospheric temperature
   b. water
   c. room temperature *
   d. standard temperature

140. At the one end of the range are highly β stabilised and deep
   a. hardening alloy *
   b. softening alloy
   c. both a. & b.
   d. none of the above

141. Which of the following are considered shallow hardening alloy
   a. Ti - 7AI - 4v
   b. Ti - 6AI - 4v *
   c. Ti - 8AI - 5v
   d. none of the above

142. Which of the following are considered general purpose titanium alloy
   a. Ti - 6AI - 4v *
   b. Ti - 3AI - 5v
   c. Ti - 4AI - 4v
   d. Ti - 5AI - 8v

143. Ti - 6AI - 4v considered almost
   a. 30 - 40% production
   b. 40 - 45% production
   c. 50 - 60% production
   d. 70 - 80% production *

144. Ti-alloys are replaced with
   a. aluminium alloys
   b. vanadium alloys *
   c. magnasium alloys
   d. all of the above

145. Vanadium alloys are normally
   a. weldable
   b. non-weldable *
   c. hardening by any means
   d. none of the above

146. For high temperature application, the alloy is;
   a. magnasium
   b. vanadium *
   c. aluminium
   d. zinc

147. Replacing titanium with vanadium contains
   a. Mo (3.3%) *
   b. Mo (3.4%)
   c. Mo (4.0%)
   d. Mo (5.2%)

148. Titanium alloy is used for manufacturing
   a. landing gear
   b. bulk head
   c. fan disc
   d. all of the above *

149. A unique α-β alloy Ti - 3AI - 2.5v is most commonly used for
   a. pipes fittings   b. tubes *
   c. frame   d. bulkhead

150. Processing in β field is thus possible at temperature of about
   a. 700^0 C   b. 800^0 C *
   c. 900^0 C   d. 500^0 C

151. Near β -range of alloys incorporate the highest strength grades of titanium with yield strength in excess of
   a. 1200 MPa *
   b. 1100 MPa
   c. 1150 MPa
   d. 1000 MPa

152. α. and b. does not take place during industrially employed
   a. thermotreatment
   b. thermodynamical treatment *
   c. electrical treatment
   d. all of the above

153. Thermodynamically treated alloys are highly
   a. cold worked *
   b. hot worked
   c. both a. & b.
   d. none of the above

154. For longer life at higher temperature titanium alumide are formed as
   a. alpha
   b. beta
   c. a. & b. both are aluminides *
   d. none of the above

155. Gamma aluminide showing stress cracking caused by
   a. thermal concentration *
   b. ceramic mould
   c. both a. & b.
   d. none of the above

156. Slow cooling favours the formation of
   a. colonies *
   b. colours
   c. materials
   d. all of the above

157. At high β stabilizer contents rapid cooling can suppress martensitic α formation and metastable β is retained at
   a. room temperature
   b. ambient temperature *
   c. both a. & b.
   d. none of the above

158. STOA stands for
   a. annealed
   b. duplex annealed
   c. solution treated and over aged *
   d. all of the above

159. The condition RA. and b.A are applied to
   a. α b. β
   c. α+β * d. all of the above

160. Slight reduction in α+β alloys
   a. tensile properties *
   b. toughness
   c. malliability
   d. all of the above

161. α+β alloys posses
   a. tensile strength
   b. fatique properties
   c. both above *
   d. none of the above

162. Fracture toughness on the other hand is improved by raising the
   a. solution treatment *
   b. hammering
   c. both a. & b.
   d. none of the above

163. α+β range are annealed at
   a. higher temperature
   b. lower temperature *
   c. both
   d. none of the above

164. Titanium alloy in the first two decades of development were aimed at higher tensile properties
   a. for lower temperature *
   b. for medium temperature
   c. for higher temperature
   d. none of the above

165. The temperature for titanium annealing is
   a. 250^0C b. 260^0 C *
   c. 230^0C d. 280^0C

166. Ti_2Al and γ (TiAl) eventually may show good creep capability upto
   a. 0.6 *
   b. 0.5
   c. 0.4
   d. 0.3

167. Creep capabilities even at
   a. 0.4 melting point
   b. 0.5 melting point *
   c. 0.3 melting point
   d. 0.2 melting point

168. Tensile strength of titanium alloys can ranges from about
   a. 500 MPa *
   b. 400 MPa
   c. 300 MPa
   d. 200 MPa

169. α+β materials lie in the intermediate range of
   a. 400 - 500 MPa
   b. 500 - 600 MPa
   c. 900 - 1300 MPa *
   d. 1200 - 1400 MPa

170. Water quenched from the α+β field and tempered at
   a. 400^0 C
   b. 500^0 C *
   c. 600^0 C
   d. 700^0 C

171. Creep strength of Ni-base alloy can be retained upto
   a. 0.8 melting point * b. 0.9 melting point
   c. 10 melting point d. 11 melting point

172. Tensile strength of Ti-alloys increased to very high levels with introduction of
   a. Ti - 7Al - 4V - 2L
   b. Ti - 6Al - 4V - 2Sn *
   c. Ti - 5Al - 4V - 3Sn
   d. Ti - 5Al - 4V - 2Sn

173. Tensile strength of C.P is about
   a. 400 mpa b. 600 mpa
   c. 500 mpa * d. 700 mpa

174. Tensile strength of age hardened β alloys are
   a. 1500 mpa * b. 1400 mpa
   c. 1200 mpa d. 1100 mpa

175. $\alpha + \beta$ alloys has intermediate range
   a. 400 - 700 mpa b. 900 - 1300 mpa *
   c. 800 - 1100 mpa d. 500 - 1300 mpa

176. Mar tensite is a
   a. hard b. very hard *
   c. soft d. very soft

177. Water quenched from the $\alpha + \beta$ field and tempered at
    a. 300 ^{0}C b. 500^{0}C *
    c. 600^{0}C d. 700^{0}C

178. In air cooled material increasing strength by
    a. 50% b. 70%
    c. 25% * d. 20%

179. In some alloys which type of equation has been developed
    a. empirical *
    b. Boyl's equation
    c. Charl's equation
    d. All of the above

180. Aging to higher strength results in a further loss of
    a. Malleability b. Ductility *
    c. Stiffness d. tensile strength

181. Alloying in small amount of Silicon results in reduction of
    a. dislocation motion in creep *
    b. dislocation motion in fatique
    c. both (a) & (b) are correct
    d. both (a) & (b) are wrong.

182. To reduce creep what amount of Silicon is added to titainum
    a. < 0.9% wt% b. <.5 % Wt % *
    c. <.4 % Wt % d. <.8 % Wt %

183. The low level of β stabilizing improves
    a. cold workability
    b. hot workability *
    c. both (a) & (c)
    d. none of the above

184. Titanium metal passes through four major steps during processing from ore to finished product they are
    a. reduction of Titanium one to a porous form of titanium called 'sponge'.
    b. melting of sponge to form ingot
    c. primary fabrication in which ingots are converted into general melt products
    d. all of the above *

185. Sponge is a
    a. reduction of titanium one to a porous form of titanium *
    b. reduction of Aluminium one to a porous form of Aluminium
    c. both (a) & (b)
    d. none of the above

186. Secondary fabrication of finished shapes
    a. porous products b. mill products *
    c. both (a) & (b) d. none of the above

187. Mechanical and physical properties of titanium affected by several factors they depends upon
    a. amount & type specified alloying element
    b. melting process used for making ingot
    c. method of thermo mechanical properties
    d. all of the above *

188 The raw materials used in producing titanium are
    a. titanium in the form of sponge metal
    b. alloying addition
    c. reclaimed titanium creep
    d. all of the above *

189. Titanium sponge is manufactured by first
    a. chlorinating rufile *
    b. any one
    c. both (a) & (b)
    d. none of the above

190. Reducing $TiCl_4$ with
    a. Na b. Mg metals
    c. both (a) & (b) * d. none of the above

191. Residual element in sponge Titanium are
    a. Carbon b. Nitrogen
    c. Oxygen d. all of the above *

192. Carbon & Nitrogen in Titanium element reduces
    a. ductibility * b. malleability
    c. elasticity d. all of the above

193. Electolytic method have also been used to produce
    a. Aluminium Sponge b. Titanium Sponge *
    c. both (a) & (b) d. none of the above

194. The common alloying element of titanium are
    a. Al b. V
    c. Mo d. all of the above *

195. The alloying element of titanium are
    a. Zr b. Cr
    c. Si d. all of the above *

196. The common alloying element of titanium are
    a. Sn b. Mn
    c. O d. all of the above *

197. Basically Oxygen & Iron content determine
    a. strength level * b. hardness
    c. both (a) & (b) d. none of the above

198. Bascially Oxygen and Iron contents determine the strength levels of CP titanium and the difference in Mechanical properties between in
    a. ELI grade and standard grades of Ti alloy *
    b. only ELI grade
    c. both (a) & (b)
    d. none of the above

199. The machining of integrally stiffened aircraft parts leads to a scrap-to-part ratio of about
a. 25% b. 85% *
c. 90% d. 95%

200. Titanium is melted either under vaccum or in an atmosphere of inert gas such as
a. Helium
b. Argon
c. both (a) & (b) *
d. none of the above

201. The usage of induction melting has been quite limited
a. graphite
b. ceramic
c. both (a) & (b) *
d. none

202. VAR stands for
a. vaccum Arc remelting *
b. vary arc remelting
c. both (a) & (b)
d. none of the above

203. LDI stands for
a. lower density inclusions
b. lower demonstration inclusions
c. low-density inclusion *
d. none of the above.

204. LDI or Hard-alpha-defects are alpha-stabilised particles containing large amounts
a. Nitrogen
b. Oxygen
c. both (a) & (b) *
d. none

205. Machine turnings cut with
a. carbide tools *
b. metal cutting tool
c. both (a) & (b)
d. none of the above.

206. Large, soft - alpha segregates called
a. Type - 1 defect b. Type - 2 defect *
c. both (a) & (b) d. none of the above

207. In Type - 1 defect, alpha - stabilised particles containing large amount of
a. Nitrogen
b. Oxygen
c. both (a) & (b) *
d. none of the above

208. Type - II defects are occasionally found in alloys containing
a. Aluminium
b. Tin
c. both (a) or (b) *
d. none of the above

209. EBM stands for
a. electron beam melting *
b. electricity beam melting
c. equal beam melting
d. none of the above

210. Arcs are limited to
a. 3.5 - 5 cm b. 2.5 - 5 cm *
c. 3 - 6 cm d. all of the above

211. Triple melting is used to achieve better
a. uniformity * b. non uniformity
c. stability d. unstability

212. Triple melting reduces in microstructure
a. Oxygen rich b. Nitrogen rich
c. both (a) & (b) d. none of the above

213. Many advances have also been introduced for automation of melting process
a. computer control b. melting speed
c. hot topping d. all of the above *

214. The basic operation of a consumable arc furnance consists of maintaining arc of
a. 35 to 50 volts *
b. 40 to 60 volts
c. 45 to 65 volts
d. 50 to 55 volts

215. The current generally required to operate VAR is
a. 400 amp / cm dia. b. 450 amp / cm dia. *
c. 350 amp / cm dia. d. 200 amp / cm dia.

216. Accordingly largest system has the capacity of upto
a. 45 KV * b. 40 KV
c. 35 KV d. 20 KV

217. Melting in vaccum reduces
a. Nitrogen content b. Hydrogen content *
c. Oxygen content d. Argon content

218. VAR is usually operated with a
a. negative polarity of electrode *
b. positive polarity of electrodes
c. positive polarity of material
d. negative polarity of material

219. As one electrode melt is made upto
a. 20 to 40 b. 30 to 40 *
c. 40 to 50 d. 50 to 60

220. The recent development of non-consumable rotating
a. water cooled * b. air cooled
c. vaccum cooled d. all of the above

221. Which of the following is used as a electrode
a. Bototrode b. Rototrode *
c. both (a) & (b) d. none of the above

222. Rototrode indicates that
   a. copper pick up * b. iron pick up
   c. magnesium pick up d. all of the above

223. The NCE-VAR furnances have also been devised either to operate according to skull melting procedure for
   a. consumable electrode
   b. non-consumable electrode *
   c. both (a) & (b)
   d. none of the above

224. EBM stands for
   a. electron beam melting *
   b. electricity beam melting
   c. electricity beam metal
   d. all of the above.

225. EBM produces Hollow titanium ingot has the outer diameter of about
   a. 350 mm b. 300 mm *
   c. 250 mm d. 200 mm

226. The inner diameter of hollow titanium ingot has the
   a. .80 mm b. 85 mm
   c. 90 mm * d. 95 mm

227. EBM using drip melting technique has been successfully employed for production of alloy in
   a. single phase * b. double phase
   c. triple phase d. all of the above.

228. PAM stands for
   a. plasma Arc melting * b. post Arc melting
   c. both (a) & (b) d. none of the above

229. Cold wall induction method is developed for producing
   a. clean titanium ingot * b. only titanium ingot
   c. both (a) & (b) d. none of the above

230. By using cold wall induction method have been producing
   a. ingot 100 mm b. ingot 150 mm *
   c. ingot 50 mm d. ingot 25 mm

231. By using cold wall induction method have been producing
   a. 4 m long b. 3 m long
   c. 2 m long * d. 1 m long

232. At any given temp diffusion is much faster in
   a. μ - phase b. β - phase *
   c. μ - β phase d. β - μ phase

233. Diffusibility of pure titanium increases nearly three orders of magnitude at
   a. 800^0C b. 875^0C
   c. 883^0C * d. 850^0C

234. Diffusibility is hundred or more times faster in β than
   a. $\propto$ * b. $\propto$ - β
   c. β - $\propto$ d. all of the above

235. Surface contamination in titanium alloy by absorption of
   a. Oxygen b. Nitrogen
   c. both (a) & (b) * d. none

236. Texture plays an important role in
   a. safe life * b. service life
   c. both d. none

237. Texture development is more prominent while working on
   a. Isometric
   b. Isotropic hexagonal shape *
   c. Isotropic round shape
   d. none

238. Low thermal conductivity of titanium can result in
   a. localised heating * b. only cooling
   c. at elivated temp d. all of the above

239. In primary working includes all operations that converts ingot into general mill products
   a. billet b. bar
   c. sheet d. all of the above *

240. Hot working of titanium is normally carried out lower than
   a. steel b. Nickel base alloys
   c. both (a) & (b) * d. none

241. Mechanical properties of titanium alloys are
   a. ductility b. toughness
   c. fatigue d. all of the above

242. To get uniform grain structure in
   a. vaccum * b. air
   c. water d. oil

243. Preheating of titanium is necessary for
   a. Carbonisation b. Oxidation *
   c. Nitriding d. relieve heat

244. At which temp Oxygen react with titanium
   a. 500^0C b. 520^0C
   c. 540^0C * d. 560^0C

245. Oxygen & Nitrogen react with titanium to form an
   a. adherent surface layer *
   b. intra surface layer
   c. reshape grain surface
   d. all of the above

246. By using fused glass coating Hydrogen trick up in forgings is generally restricted to values below
   a. 40 ppm * b. 30 ppm
   c. 20 ppm d. 10 ppm

247. Glass coating also reduces excessive
  a. reduction b. oxidation *
  c. carburization d. all of the above

248. Heavy scale still forms on the
  a. bloom b. bar
  c. billet * d. all

249. Oxygen contaminated metal beneath the scale, which is removed by
  a. sand blasting b. surface grinding
  c. both (a) & (b) * d. none

250. Heating time during forging kept
  a. long b. short *
  c. very long d. none

251. Heating time during forging kept as short as possible to minimize
  a. the depth of contaminated layer *
  b. no relation to the depth
  c. both are wrong
  d. relation to the stress

252. What is the difference between the furnance used in Al-alloy & titanium alloy
  a. withstands high temp *
  b. withstand high pressure
  c. both (a) & (b)
  d. withstand high temp & low pressure

253. Most breakdown fabrication is done by
  a. slow acting hyd. presses *
  b. pnumatic presses
  c. air presses
  d. all of the above

254. The main problem associated with titanium alloy in forging is
  a. broad temp range b. narrow temp range *
  c. no effect on temp. d. all of the above

255. Initial working of ingot is mostly
  a. pre cogging operation
  b. post cogging operation
  c. press cogging operation *
  d. all of the above

256. The beta forgeable alloys are considered easier to handle in terms of
  a. temperature control b. forging operation
  c. both (a) & (b) * d. none of the above

257. The problem encountered in the production of beta-forgeable alloys are mainly non-uniformity of grain size and
  a. contamination of Hydrogen *
  b. contamination of Oxygen
  c. contamination of Nitrogen
  d. contamination of Carbon

258. Hydrogen contamination can be avoided by using
  a. glass
  b. proprietary ceramic coating
  c. both (a) & (b) *
  d. none of the above

259. Generally to take the advantage of better plasticity and lower forging pressure offered by
  a. β - forging b. $\alpha + \beta$ forging
  c. both (a) & (b) * d. none of the above

260. The finish forging is however done well below
  a. beta - transus temperature *
  b. alpha - transus temperature
  c. alpha - beta transus temperature
  d. none of the above

261. Advantage of forging □□$\propto + \beta$ alloy are
  a. creep resistance b. toughness
  c. fatigue resistance d. all of the above *

262. The greater the degree of working in $\propto + \beta$ field contributes a lot to the resultant
  a. physical properties b. mechanical properties
  c. both * d. none

263. Carbon is added to provide desired
  a. low gradient to β - approach *
  b. high gradient to α - approach
  c. both (a) & (b)
  d. none

264. It was reported that starting IMI 834 material produced by
  a. extrusion
  b. contained high volume fraction
  c. both (a) & (b) *
  d. none

265. Subsequent annealing at a temperature chosen from the β approach curve provided
  a. 3% primary α b. 5% primary α
  c. 2% primary α d. 7% primary α *

266. Higher or lower fabrication of α can also be obtained for desired
  a. mechanical property combination *
  b. physical properties combination
  c. both (a) & (b)
  d. none of the above

267. β - forging resulted in higher
  a. creep
  b. better fracture toughness
  c. both *
  d. none

268. Heating is done in
a. air b. LPG
c. both (a) & (b) * d. none

269. Heating furnance will have
a. slightly oxidizing b. argon atmosphere
c. both (a) & (b) * d. none

270. Bars upto about 100mm in diameter are
a. unidirectional rolled * b. multi directional rolled
c. both (a) & (b) d. none

271. Higher the deformation
a. higher the mechanical properties
b. better the mechanical properties *
c. lesser the mechanical properties
d. none

272. Transverse ductility is generally lowers in bars above
a. 65mm dia. * b. 60mm dia.
c. 55mm dia. d. 50mm dia.

273. Directionality in properties is observed only as a slight drop in transverse ductility of plate greater than
a. 20mm thickness b. 25mm thickness *
c. 15mm thickness d. 10mm thickness

274. AMS and all other purchase specification prescribe
a. lower minimum tensile strength *
b. lower maximum tensile strength
c. lower maximum compressive strength
d. higher minimum compressive strength

275. During cold rolling high strength of titanium upto
a. 400^0C makes the gauge control extremely difficult
b. 420^0C makes the gauge control extremely difficult
c. 430^0C makes the gauge control extremely difficult*
d. 450^0C makes the gauge extremely difficult

276. Senzimir mills are normally employed for the rolling of sheet below
a. 20mm thickness * b. 40mm thickness
c. 50mm thickness d. 60 mm thickness

277. Annealing of thin sheet is mostly done in
a. vaccum
b. under inert atmosphere
c. both (a) & (b) *
d. none of the above

278. The annealing temp is less than
a. 400^0C b. 850^0C *
c. 900^0C d. 1000^0C

279. Annealing in vaccum eliminates formation of $\propto$ - casing and help
a. remove hydrogen pick ups
b. control Hydrogen pickups
c. both (a) & (b) *
d. none of the above

280. Where the component required to perticular shape use
a. primary fabrication b. secondary fabrication*
c. both fabrication d. none

281. $\propto+\beta$ forging is employed since advantages are found in both
a. processes b. difference in properties
c. both (a) & (b) * d. none of the above

282. Extrusion is an alternative mill process to rolling for making
a. rod like products * b. complex structure
c. both d. none

283. Extruded products are
a. stringers b. narrow pannels
c. Hydraulic tubes d. all of the above *

284. Production of tapered wing spares for
a. civil a/c b. military a/c
c. both (a) & (b) * d. none of the above

285. Titanium alloy Ti-3Al-2.5V is
a. hard in nature b. Brittle in nature
c. Malleable in nature * d. ductile in nature

286. Ti-3Al-2.5V Titanium alloy widely used for making
a. tubes * b. structures
c. landing gear d. all

287. Preheating of Titanium alloy vary from
a. 600 - 800^0C b. 675 - 980^0C *
c. 775 - 1050^0C d. 850 - 950^0C

288. Intermediate vaccum annealing at
a. 400^0C b. 500^0C
c. 700^0C * d. 900^0C

289. The finished tube is stress relieved about
a. 400^0C b. 370^0C *
c. 340^0C d. 310^0C

290. What are process used for surface finish
a. Grinding b. Blasting
c. Pickling d. all of the above *

291. Major improvement in the formability of titanium alloys occur above
a. 400^0C b. 500^0C *
c. 700^0C d. 800^0C

292. The reason for improvement in the formability of titanium alloys are
a. the decrease in flow stress due to increased importance becomes appreciable
b. strain rate - hardening becomes increasingly important
c. the vibrations in yield strength for heat-to-heat diminishes
d. all of the above *

293. Alloys containing higher β - stabilisers are generally
a. weldable *
b. not weldable
c. both (a) + (b) are wrong
d. both (a) + (b) are correct

294. □□∝ + β alloys containing more than about 3% β are difficult to
a. weld *
b. without weld embrittlement
c. both (a) & (b)
d. none

295. Weld zone proportion improved by
a. resolution treatment
b. aging
c. both *
d. none

296. Precautions are taken to protect molten or hot titanium from
a. Oxygen b. Hydrogen
c. Nitrogen d. all *

297. Welding process applicable to titanium
a. arc b. spot
c. seam d. all *

298. Welds shows following trends
a. welding generally increasing strength
b. welding generally increasing hardness
c. welding generally decreases tensile strength
d. all *

299. Welds in unalloyed titanium grades
a. not require postweld treatment
b. unless material will be in highly stressed condition in a strong reducing atmosphere
c. both (a) & (b) *
d. none

300. Weld in Beta rich alloy have tendency to
a. fracturing *
b. with little plasting hardening
c. decreases postweld heat treatment
d. all

301. Rich beta stabilized alloys are
a. weldable b. with good ductility
c. both * d. none

302. Electron beam and laser welds are made
a. without filler metal
b. weld beads have high ratios of depth to width
c. both (a) & (b) *
d. none

303. Electron beam allows excellent welds to be made in
a. light section b. heavy section *
c. both d. none

304. Which of the following are successfully used in Titanium alloys are
a. adhesive bonding
b. brazing
c. mechanical fastening
d. all *

305. Selection of NNS processes depends on
a. part economics b. performance
c. quality standard d. all of the above *

306. HIP stands for
a. hot isostatic pressing *
b. hallow isostatic pressing
c. both (a) & (b)
d. none of the above

307. In isothermal forging process
a. the temp varies
b. temp is constant *
c. Pr. varies
d. none of the above

308. The ISO thermal forging helps in reducing or even totally eliminating the influence of
a. die chilling * b. die casting
c. die forging d. all of the above

309. Temp constant in forging helps to reduce or totally eliminating of die chilling
a. material stress releving
b. material strain hardening *
c. both (a) & (b)
d. none of the above

310. Hot dies retain their temp upto
a. 700 - 980^{0}C * b. 600 - 880^{0}C
c. 500 - 600^{0}C d. 400 - 700^{0}C

311. Forging stock thus expanding the time period for
a. pressing purposes b. shaping process *
c. both d. none

312. Decreasing the strain rate on hydraulic presses from
a. 400mm/second b. 200mm/second *
c. 300mm/second d. 500mm/second

313. The traditional approach is to hot work titanium alloys high in
a. α - β field * b. β field
c. b field d. all of the above

314. Forging in hot dies pressure reduces from
a. 400 - 800 mpa b. 400 - 1000 mpa
c. 400 - 1050 mpa * d. 400 - 1100 mpa

315. Hot die metal utilisation significantly improves by
a. 10-20% b. 20-40%
c. 40-60% d. 60-870%

316. To minimise high machining costs it is required to
 a. remove excess aluminium shock
 b. remove excess titanium shock *
 c. both (a) & (b)
 d. none of the above

317. Die material used in Isothermal die forging are
 a. cast b. wrought
 c. (a) or (b) * d. none

318. Die temp control is critical to part dimensional
 a. uniformity * b. simplicity
 c. both (a) & (b) d. none

319. Cooling rate are kept uniform throughout the part to minimise
 a. distortion of thick section
 b. distortion of thin section *
 c. distortion of medium section
 d. none

320. Special fixtures are employed to maintain tolerances during
 a. subsequent heat treatment *
 b. cooling
 c. hardening
 d. hammering

321. For better structural uniformity
 a. reduction in section six
 b. improvement in temp
 c. forging from surface to interior
 d. all of the above *

322. Application of Hot die technology are
 a. backhead centre body
 b. fan disks
 c. first stage and second stage compressors
 d. all of the above *

323. Super plasticity
 a. produces essentially neckfree elongation of many hundred percent of material *
 b. produces a tight fit point
 c. both (a) & (b)
 d. none of the above

324. Optimum conditions in superplasticity are usually presence of
 a. fine grains
 b. equioxed grains
 c. disordered high angle boundaries
 d. all of the above *

325. Tm - stands for
 a. absolute matching surface
 b. absolute melting temperature *
 c. total melting temperature
 d. all of the above

326. σ = KE'M, σ is a
 a. density
 b. mass
 c. steady stress flow stress *
 d. none

327. σ = KE'M , E' is a
 a. imposed strain rate *
 b. density
 c. mass
 d. steady stress flow stress

328. Superplastic deformation is characterised by low stress
 a. < 5 mpa b. <10 mpa *
 c. <15 mpa d. <20 mpa

329. Lack of accommodation causes internal cavitation which reduces
 a. ductility * b. malliability
 c. stress d. all

330. Higher the m value
 a. lesser is the resistance to localized nacking
 b. greater is the resistance to localized nacking *
 c. both (a) & (b)
 d. none

331. For most superplastic alloys ranges between
 a. .4 to .7 * b. .5 to .8
 c. .6 to .9 d. .9 to 1

332. Permanent failure can occur due to
 a. internal cavitation
 b. growth
 c. coalescence of the cavity
 d. all of the above *

333. Which is more prone to rapid grain coarsening
 a. alpha b. beta *
 c. both d. none

334. Maximum superplasticity is reported to occur with about
 a. 30-50% b. 50-70% *
 c. 70-90% d. 40-90%

335. Maximum superplasticity is reported to occur with max. temp of about
 a. 850 - 900 ^{0}C *
 b. 750 - 800 ^{0}C
 c. 650 - 700 ^{0}C
 d. 550-600 ^{0}C

336. Micro duplex alloys do not normally cavitate during SPF because of absence of
 a. hard particles such as carbidos
 b. Nitrides
 c. Oxides
 d. all of the above *

237. Major disadvantage in SPF
a. low temp b. high temp *
c. no effect d. none

338. Special processing to achieve fine grain size followed by rolling at
a. 400 ^{0}C b. 500 ^{0}C
c. 800 ^{0}C * d. none

339. In several phases, reduction in grain size is
a. 40% b. 30%
c. 70% d. 80% *

340. By varying the alloy compositionso as to reduce
a. β transus temp * b. α transus temp
c. $\beta + \alpha$ transus temp d. none

341. By changing composition essentially leads to the creation of a
a. same alloy
b. as in (a) & more strength
c. new alloy *
d. none

342. Titanium alloys can readily absorb at elevated temp the addition of
a. Hydrogen * b. Nitrogen
c. Carbon d. Oxygen

343. In SPF + OB process which of the following are produced
a. doors b. wing panels
c. fuselage d. all of the above *

344. Most influenced properties are
a. compaitibility
b. grain size
c. general mechanical properties & microstructure
d. all of the above *

345. Cold compaction of 85-90% green density is done at pressure to
a. 400 mpa * b. 300mpa
c. 200 mpa d. 100mpa

346. Normally pure titanium is obtained as the by product of
a. KROLL b. HUNTER
c. both (a) or (b) * d. none

347. BE and MP products are very difficult to
a. weld * b. brazing
c. solding d. all

348. In BUS treatment micro structure is refined by
a. short time annealing
b. long time annealing *
c. both
d. none

349. Bus treatment microstructure is significant improvement in
a. tensile straingth b. fatigue resistance
c. both (a) & (b) d. done

350. BE & MP components are used in
a. non-critical aerospace application
b. a/c Hydraulic fittings to missile parts
c. both (a) & (b) *
d. none

351. Hydride - dehydride process also termed as
a. comminution process *
b. welding process
c. fusion process
d. all of the above

352. REP stands for
a. report electrical process
b. rotating electrode process *
c. both (a) & (b)
d. none of the above

353. Tungsten cathod introduces
a. M-particles b. Z-particles
c. W-particles * d. X-particles

354. PREP stands for
a. plasma rotating electrode process *
b. pre rotating electrical product
c. pre rotating electrode process
d. all of the above

355. Permanent drop method has the capability of producing particles of
a. spherical to stable b. flat morphologies
c. both (a) & (b) * d. none of the above

356. Hipping is a process in which
a. pressure & temp applied simultaneously *
b. pressure is applied
c. temp is applied
d. none of the above

357. Ceracon process is a process that makes use of
a. soft tooling using a granular pressing medium
b. conventional hot pressing
c. both (a) & (b) *
d. none

358. Vaccum hot pressing utilises
a. hot compaction of powder
b. forge press under vaccum
c. both (a) & (b) *
d. none

359. Extrusion is carried out with
a. loose powder b. precompacted powder
c. both (a) & (b) * d. none

360. The melting is generally carried out by
  a. vaccum are * b. in air
  c. dry air d. water

361. Titaniums are sucessfully produced as ingot could be cast without encountering problems of
  a. castability b. fluidity
  c. both * d. none

362. Titanium castings are made by
  a. rammed graphite
  b. investment casting techniques
  c. both (a) & (b) *
  d. none

363. By investment casting which of the followings are made
  a. thin walled b. intricate shape
  c. both (a) & (b) * d. none

364. Investment casting have better
  a. dimensional accuracy *
  b. toughness
  c. both (a) & (b)
  d. none of the above

365. The major products are manufactured by
  a. casting
  b. investment casting *
  c. both (a) & (b)
  d. none

366. The wax pattern with gating system is then dipped several times in
  a. ceramic slurry * b. H_2SO_4
  c. HCl d. Carbon

367. The wax pattern is then removed by melting in a
  a. ceramic shell b. steam autoclave *
  c. both d. none

368. The intermetallic offers
  a. higher stiffness b. superior creep
  c. oxidation d. all of the above *

369. Intermetallic oxidation resistance offers up to
  a. 1000 ^{0}C * b. 900 ^{0}C
  c. 850 ^{0}C d. 700 ^{0}C

370. Inter metallic offers
  a. low ductility b. toughness
  c. fatigue d. all *

371. Properties of Gamma Titanium alloys are
  a. yield strength
  b. tensile strength
  c. room-temp ductility
  d. all of the above *

372. Addition of Nb or Ta strengthens the alloy and
  a. improves oxidation resistance *
  b. decrease oxidation resistance
  c. none
  d. tensile strength decreases

373. To improve ductility addition is required of
  a. cr b. V
  c. mn d. all *

374. Combined addition of O,N,C & B affect
  a. maliability b. stifftness
  c. ductility * d. all

375. Vanadium can also be added in place of
  a. Al b. Nb *
  c. fe d. Ti

376. Addition of Mo improves
  a. temperature strength *
  b. pressure
  c. density
  d. all

377. Titanium alloys are most widely used for high temp upto
  a. 500^{0}C b. 600^{0}C *
  c. 700^{0}C d. 800^{0}C

378. Static and dynamic properties affect
  a. service life * b. self life
  c. both (a) & (b) d. none

379. Extra attention is required in Titanium alloy for
  a. trace element analysis
  b. metallographic evaluation
  c. both (a) & (b) *
  d. none

380. Testing, static and dynamic properties i.e.
  a. tensile
  b. creep tensile
  c. stress rupture
  d. all of the above *

381. Aeroengine compressor parts are required to achieve
  a. strength *
  b. as in (a) leak tight joint
  c. asin (b) with minimum weight
  d. none of the above

382. Titanium & its alloys are used in
  a. cast b. rolled
  c. extruded d. all *

383. The major application of Titanium in aerospace is
  a. skin
  b. body structure
  c. landing gear
  d. all of the above *

384. Non-Aeronautical application includes
 a. steam turbine blades
 b. hydrogen storage media
 c. lathe beds
 d. both (a) & (b) *

385. C.P titanium is used almost exclusively for its excellent
 a. corrosion resistance *
 b. fatigue resistance
 c. both (a) & (b)
 d. hardness

386. Alloy Ti - 5Al-2.5 Sn is a moderate strength grade with good
 a. elevated temperature
 b. cryogenic properties
 c. both (a) & (b) *
 d. none

387. Alloy Ti-8Al-1 Mo - IV has excellent
 a. creep resistance *
 b. corrosion resistance
 c. fatigue resistance
 d. (b) & (c)are correct.

388. Alloy Ti-8Al - 1Mo-IV has excellent creep resistance upto
 a. 400^0C b. 450^0C *
 c. 300^0C d. 250^0C

389. Ti-6Al-4V have
 a. compositional forging
 b. thermal treatment
 c. both (a) & (b) *
 d. none

390. Titan 20 A is
 a. 99.01 to 99.5 titanium *
 b. 89.01 to 90.5 titanium
 c. 75.5 to 80.5 titanium
 d. 65.4 to 94.5 titanium

391. Titan 20 A contain
 a. Carbon b. Iron
 c. Hydrogen d. all of the above *

392. Properties of titan 20 A is
 a. high ductility b. corrosion resistance
 c. good weldability d. all of the above *

393. Equivalent specification for BS2TA7
 a. Bar section
 b. for machining of C.P titanium
 c. both (a) & (b) *
 d. none

394. Equivalent specification for BS2TA8
 a. forging stock for C.P titanium *
 b. bar section
 c. rings
 d. tubular section

395. Equivalent specification for MSRR 8607
 a. bar & section for machining
 b. forging stock
 c. forging of C.P titanium
 d. all of the above *

396. Thermal conductivity of Titan-20A is
 a. 16 $Wm^{-1}k^{-1}$ * b. 18 $Wm^{-1}k^{-1}$
 c. 16 $Wm^{-2}k^{-3}$ d. 14 $Wm^{-1}k^{-2}$

397. Density of Titan - 20A is
 a. 4 g / cm^3 b. 4.51 g / cm^3 *
 c. 5.4 4g / cm^3 d. 6.2 g / cm^3

398. Application of Titan -20A is
 a. engine inlet ducts *
 b. exhaust pipe
 c. shroud
 d. all of the above

399. Alloys of Titanium are
 a. Titan 22A b. Titan 20A
 c. both (a) & (b) * d. none

400. Titan 22A alloys are developed for
 a. engine use * b. airframe
 c. both d. none

401. The characteristics of Titan 22A alloy is
 a. creep strength
 b. good weldability
 c. both (a) & (b) *
 d. none of the above

402. Primary melting of Titan 22A alloy is by :
 a. vaccum Arc remelting *
 b. air remelting
 c. both (a) & (b)
 d. none of the above

403. Secondary melting of Titan 22A alloy is
 a. air melting
 b. dry air remelting
 c. vaccum arc remelting *
 d. all of the above

404. Thermal conductivity of Titan 22A alloy at (20 - 100^0C) is
 a. 6.47 $Wm^{-1}K^{-1}$ b. 6.57 $Wm^{-1}K^{-1}$ *
 c. 6.47 $m^{-1}K^{-1}$ d. 6.57 m^{-1}

405. Heat treatment time for Titan 22A alloy is
 a. 1 hour * b. 2 hour
 c. 4 hour d. 8 hour

406. Application of Titan 22 A alloy is
 a. stator blades
 b. rotor blades *
 c. both (a) & (b)
 d. none of the above

407. Titan 31 A is mostly used alloy of all
   a. $\propto$ - β composition $\propto$
   b. $\propto$ - composition
   c. β - composition
   d. all alloy composition *

408. Vanadium is a
   a. $\propto$ - stabilizer
   b. β - stabilizer *
   c. both (a) & (b)
   d. none of the above

409. The alloy has good strength and high ductility upto
   a. 300^0C
   b .350^0C *
   c. 400^0C
   d. 450^0C

410. Very high strength is obtained in Titan 31 alloy in
   a. cryogenic temperature *
   b. critical temperature
   c. any temperature
   d. none of the above

411. Improved properties obtained by using
   a. ELI grade
   b. Beta processing *
   c. both (a) & (b)
   d. none of the above

412. Melting practices using Titan - 31 are
   a. primary remelting
   b. secondary remelting
   c. tertiary remelting
   d. all of the above *

413. Applications of Titan 31 A extensively used in Aircraft for making
   a. compossor blades
   b. compossor discs
   c. airframe components
   d. all of the above *

414. Which of the following referred as Half-6-4" type
   a. Ti - 3Al - 2.5 v *
   b. Ti - 6Al - 2.5 v
   c. Ti - 5Al - 2.5 v
   d. Ti - 7Al - 2.5 v

415. Major alloying elements are in Ti - 3Al - 2.5 v
   a. aluminum
   b. vanadium
   c. both (a) & (b) *
   d. all are wrong

416. Thermochemical processing of Ti - 3Al - 2.5 v is
   a. forging
   b. extrusion
   c. pilgering
   d. all of the above *

417. Application of Ti - 3Al - 2.5 v alloy for
   a. high pr.hydraulic tubes *
   b. low pressure hydraulic tubes
   c. compressor disk
   d. all of the above

418. The major alloying element of Titanium alloys of Ti - GTM - 900
   a. aluminum
   b. molybdenum
   c. zirconium
   d. all of the above *

419. Fe and Carbon present in GTM - 900 is
   a. very less level *
   b. very high level
   c. medium level
   d. none

420. GTM - 900 is extensively used in Aeroengine compressor upto
   a. 400^0C
   b. 500^0C *
   c. 600^0C
   d. 700^0C

421. GTM - 900 is for non weldable applications and available in the form of
   a. forged
   b. hot rolled bar
   c. both (a) & (b) *
   d. none of the above

422. Titanium alloy GTM - 900 is used for making
   a. non weldable airframe machined components *
   b. weldable airframe machined components
   c. non weldable engine machined components
   d. weldable engine machined components

423. Titan 26 A has a nominal composition of
   a. Ti - 6Al - 5Zr - 0.5 Mo - 0.25 Si *
   b. Ti -56Al - 6Zr
   c. Ti - 5Al - 6Zr - 0.5 Mo - 0.4 Si
   d. Ti - 3Al - 7Zr -6 Mo - 0.4 Si

424. Titan 26 A alloy has excellent creep resistance at temperature upto
   a. 500^0C
   b. 520^0C *
   c. 540^0C
   d. 580^0C

425. Small addition of silicon in Titanium increases
   a. creep
   b. tensile strength *
   c. ductility
   d. all properties mentioned above.

426. Melting practices of Titan 26 A are
   a. primary remelting
   b. secondary remelting
   c. tertiary remelting
   d. all of the above *

427. Titanium 26 A is extensively used for
   a. HP compressor disks *
   b. LP compressor disks
   c. LP compressor blades
   d. Hp compressor blades

428. Major alloying element of BT - 31 is
   a. aluminum
   b. molybdenum
   c. chromium
   d. all *

429. BT - 31 is extensively used in
   a. blades
   b. flanges
   c. shank
   d. all of the above *

430. BT 5-1 developed for
   a. high temp application
   b. medium temp application *
   c. low temp application
   d. any temp application

431. BT - 5 - 1 is extensively used for making
   a. Engine cowling
   b. rings
   c. fasteners *
   d. all of the above

432. Major alloying element of BT - 9 are
a. aluminum b. molybdenum
c. zirconium d. all of the above *

433. Alloy BT - 9 used in aeroengine compressor upto
a. 400^0C b. 500^0C *
c. 700^0C d. 800^0C

434. BT - 9 alloy are available in the form of
a. forged b. hot rolled bar
c. both (a) & (b) * d. none of the above

435. Equivalent specification of IMI 550 are
a. bars b. billets
c. both (a) & (b) * d. hot rolled bars

436. Equivalent specification of BS - T A4 - 5l are
a. bars b. billets
c. hot rolled bars d. both (a) & (b) *

437. Equivalent specification of B5l TA 57 are
a. bars * b. hot rolled bars
c. compressor blades d. compressor discs

438. Equivalent specification of T-A 4DE
a. bars b. billets
c. hot rolled bars d. both (a) & (b) *

439. Equivalent specification of OCT .1 - 90006 - 77
a. bars
b. billets
c. both (a) & (b)
d. As (c) and titanium alloy for blade forging *

440. Equivalent specifications of OCT.1 - 90173 - 75
a. hot rolled bars *
b. cold rolled bars
c. compressor blades
d. compressor disc

441. In thermo mechanical forging process
a. 1400 T press for ingot forging
b. 1500 T press for ingot forging *
c. 1300 T press for ingot forging
d. none

442. In thermo mechanical forging process
a. mill for bar products *
b. hot rolled bar
c. compressor disks
d. turbine blades

443. Melting ranges of BT - 9 alloy are
a. 1500 - 1700^0C b. 1588 - 1715^0C *
c. 1575 - 1800^0C d. 1450 - 1830^0C

444. coefficient of linear expansion of BT - 9 at (20 - 100^0C)
a. 8.8 rm / m.k * b. 9.8 rm / m.k
c. 4.3 rm / Lk d. 4.2 rm / Dk

445. Application of BT 9 alloy in Aeronautics industry use
a. roter blade b. stater blade
c. both * d. none

446. GTRE stand for
a. gas turbine research establishment *
b. gaseous turbine rebuild establishment
c. gas turbine research engineering
d. done

447. LCA stands for
a. light civil aircraft
b. light combat aircraft *
c. both (a) & (b)
d. none

448. PTA stands for
a. pitot test aircraft
b. pilot less aircraft
c. pilotless traget aircraft *
d. none

449. RRL stands
a. regional research laboratory *
b. regional regular library
c. region repot labroratory
d. region regular library

450. OT4 - 1 alloy having a nominal composition of
a. 22.4 Al b. 2.2 Al
c. 1.8 Mn d. both (b) & (c) *

451. OT4 - 1 alloy can be classified as near
a. alpha alloy * b. beta alloy
c. alpha - beta alloy d. none of the above

452. Addition of manganese to OT4-1 alloy is to improve
a. cold workability
b. hot workability
c. improving strength
d. both (a) & (c) *

453. The impurities present in OT4 - 1 alloy are
a. oxygen b. nitrogen
c. iron d. all of the above *

454. Carbone provided to the alloy OT$ - 1 for :
a. more strength * b. britteness
c. toughness d. all of the above

455. The excess presence of following in the alloy deteriorate the alloy properties
a. nitrogen b. hydrogen
c. carbon d. all *

456. Further strength is increased in OT4 - 1 alloy by
a. precise control of grain size *
b. control on Nitrogen
c. control on Hydrogen
d. all

457. Large reduction within the low temp two phase region & during cold working have shown
   a. disadvantage of strengthening *
   b. advantage of strengthening
   c. both (a) & (b)
   d. none

458. Commercial designation of OTA - 1 alloy is
   a. Titan 23 * b. Titan 45
   c. Titan 450 d. Titan 86

459. Equivalent specification IMI 315 is
   a. HR bars b. CR sheets
   c. both (a) & (b) * d. none of the above

460. Equivalent specification DTD 5043 is
   a. HR bars b. CR sheets
   c. both (a) & (b) * d. none of the above

461. Equivalent specification for Rolled rods is
   a. OCT.1.90173 - 75 * b. OCT.1.90143 - 65
   a. OCT.1.90150 - 68 d. OCT.1.90150 - 70

462. Melting practices for Titan 23 includes
   a. primary melting b. secondary melting
   c. both (a) & (b) * d. none of the above

463. Thermo mechanical process for Titan 23 are
   a. forging b. hot rolling
   c. cold rolling d. all *

464. For forging of Titan - 23, requetes
   a. 1500 T press * b. 1800 T press
   c. 1900 T press d. 2000 T press

465. Melting range for Titan - 23
   a. 1500 - 1600^{0}C b. 1600 - 1650^{0}C *
   c. 1700 - 1800^{0}C d. 1900 - 2000^{0}C

466. Specific heat of Titan 23 at 50^{0}C
   a. 460jkg^{-1} k^{-1} * b. 450jkg^{-1} k^{-1}
   c. 400jkg^{-1} k^{-1} d. 380jkg^{-1} k^{-1}

467. Coflicient of linnear expansion at 20 - 100^{0}C is
   a. 7.5 Wm^{-1} k^{-1} b. 8.4 Wm^{-1} k^{-1} *
   c. 9.2 Wm^{-1} k^{-1} d. 9.8 Wm^{-1} k^{-1}

468. Density of Titan 23 is
   a. 4.2 g/cm^3 b. 4 g/cm^3
   c. 4.51 g/cm^3 * d. 4.8 g/cm^3

469. Restivity of Titan 23
   a. 10.5 m Wm b. 100.5 m Wm
   c. 101.5 m Wm * d. 105.6 m Wm

470. Heat treatment of BT - 9 alloys are
   a. double annealing
   b. isothermal annealing
   c. both (a) & (b) *
   d. none

471. VAR stands for
   a. vaccum Arc remelting *
   b. vary Arc removal
   c. various accessary removal
   d. none

472. Which of the following of the alloys are used for making bars & brillets
   a. IMI 550 b. BS - TA 45 - 51
   c. BSTA57 d. all *

473. Distribution of matrix controlled by
   a. thermo mechanical b. heat treatment
   c. both (a) & (b) * d. none

474. Physical & environmental effects are
   a. thermal properties
   b. melting range
   c. co-efficient of linear expansion
   d. all of the above *

475. Application of titanium OT4 - 1 alloy are
   a. exhaust shrounds b. bracket
   c. tail cone d. all *

476. Titanium is a light, strong, ductile and corrosion resistant. The annealed titanium has the tensile strength of
   a. 80000 lbs /psi * b. 72000 lbs/psi
   c. 1,10000 lbs / psi d. 1,25000 lbs / psi

477. On cold working the titanium have the yield strength of
   a. 80000 lbs /psi b. 72000 lbs/psi *
   c. 1,10000 lbs / psi d. 1,25000 lbs / psi

478. Annealed titanium under stress can elongate upto
   a. 25% b. 55 %
   c. 12% * d. 30 %

■■■

CHAPTER - 34
NICKEL ALLOYS

1. Which of the following is nickel-chromium alloy ?
   a. inconnel * b. monel
   c. k monel d. none

2. Which of the following is nickel-copper alloy ?
   a. inconnel b. monel *
   c. k monel d. none

3. Which of the following is nickel-copper-aluminium alloy ?
   a. inconnel b. monel *
   c. k monel d. none

4. Which of the following are exceptionally good strength material ?
   a. inconnel b. monel
   c. k monel * d. none

5. Which of the following is of high corrosion resistance?
   a. inconnel b. monel
   c. k monel d. both a. & b. *

6. Which of the following is non-magnetic ?
   a. inconnel b. monel
   c. k monel * d. all

7. Which of the following is especially used for exhaust collector ?
   a. inconnel * b. monel
   c. k monel d. all

8. Which of the following is/are non-ferrous material
   a. inconnel b. monel
   c. k monel d. both a. & c. *

9. Inconnel contain maximum percentage of
   a. nickel * b. chromium
   c. iron d. manganese

10. In which of following the nickel content is maximum?
    a. inconnel * b. monel
    c. k monel d. all

11. Below 18 gage (0.05 inch) which of the following welding technique is most prefered for inconnel sheet?
    a. oxyacetylene* b. electric arc welding
    c. spot welding d. seam welding

12. Above 18 gage (0.05 inch) which of the following welding technique is most prefered for inconnel sheet joining ?
    a. oxy acety lene b. electric arc welding *
    c. spot welding d. seam welding

13. Which of the following is used in manufacture of oil coolers
    a. inconnel b. monel *
    c. k monel d. none

14 Minimum nickel content is in
   a. inconnel b. monel
   c. k monel * d. all

15. Which of the following is used for structural members manufacturing in the vicinity of compass ?
    a. k monel * b. monel
    c. inconnel d. none

16. Which of the following is used for manufacturing of chemical and industrial components rather than aircraft parts ?
    a. k monel b. monel *
    c. inconel d. none

17. Which of the following have higher percentage of carbon ?
    a. inconnel * b. monel
    c. k monel d. all

18. Silicon percentage is maximum in
    a. inconnel b. monel
    c. k monel * d. all

19. Which of the following have high iron percentage ?
    a. inconnel * b. monel
    c. k monel d. all

20. Which of the following, only contains chromium ?
    a. inconnel * b. monel
    c. k monel d. none

21. Aluminium content is only present in
    a. inconnel b. monel
    c. k monel * d. none

22. Which of the following have maximum copper percentage ?
    a. inconnel b. monel *
    c. k monel d. none

23. Which of the following have good machineability ?
    a. inconnel b. monel
    c. k monel * d. all

24. Which of the following is correct regarding nickel ?
    a. density is 8.5%
    b. weight per cubic foot is 533.5 pounds
    c. weight per inches is 0.309 pounds
    d. all of the above *

25. Nickel alloys may be
    a. ferrous alloy b. non-ferrous alloy
    c. both a. or b. * d. none

26. Which of the following is Ni-alloy
    a. inconnel b. monel
    c. k monel d. all *

27. Application of inconel in a/c is
    a. exhaust collectors * b. wings
    c. stabilizers d. all

28. Monel is a
    a. nickel copper alloy * b. iron copper alloy
    c. both a. or b. d. none

29. K monel is a
    a. iron copper alloy b. nickel copper alloy *
    c. both a. or b. d. iron & magnesium alloy

30. Property of K-monel is
    a. high corrosion resistance *
    b. high strength
    c. both a. or b.
    d. none of the above

31. Important property of inconel is
    a. corrosion resistance b. heat resistance
    c. both a. or b. * d. none of the above

32. K-monel is
    a. magnetic b. non-magnetic *
    c. none of the above d. iron-base alloys

33. Inconel is composed of
    a. nickel b. chromium
    c. iron d. all of the above *

34. Nickel content in Inconel is
    a. 80.9% b. 79.5% *
    c. 69.5% d. 59.5%

35. Chromium is added in Inconel in the form of
    a. ferrochrome * b. iron
    c. ferro alloy d. iron chrome

36. Advantages of high nickel contents are
    a. good workability b. corrosion resistance
    c. both a. and b. * d. none of the above

37. Advantages of chromium contributes to
    a. strength
    b. stainless charactoristics
    c. tarnish-resistant
    d. all of the above *

38. If iron percentage is more than 20% in nickel it offers
    a. rusting b. corroding
    c. reduced strength d. all of the above *

39. Melting point of nickel is
    a. 2000^0 F b. 2540^0 F *
    c. 3000^0 F d. 4000^0 C

40. Inconel has the property of retaining strength at
    a. elevated temperature *
    b. low temperature
    c. high temperature
    d. medium temperature

41. High temperature strength is important when using inconel for
    a. heating systems b. exhaust collectors
    c. both a. or b. * d. none of the above

42. Wire upto 5/8 -inch diameter can be
    a. cold drawn b. given spring temper
    c. both a. & b. * d. low temperature

43. After cooling the springs should be treated at
    a. 400^0 F b. 500^0 F
    c. 700^0 F d. 800^0 F *

44. Inconel can not be hardened by
    a. heat treatment * b. cold working
    c. both a. or b. d. none

45. For softening inconel
    a. heat treatment is done
    b. annealing is done *
    c. cold working is done
    d. all of the above

46. Internal stresses sets up during
    a. cold rolling b. fabrication
    c. both a. or b. * d. none of the above

47. For heat treatment of nickel alloy, the heating time is
    a. 2 hour b. 3 hour
    c. 1 hour * d. 4 hour

48. Temperature range for heat treatment of nickel alloy
    a. $700 - 800^0$ F b. $800 - 900^0$ F *
    c. $900 - 1000^0$ F d. $1000 - 1100^0$ F

49. Cooling may be effected by
    a. furnace cooling
    b. quenching in air
    c. dilute alcohol-water solution
    d. all of the above *

50. Water or alcohol quenching is preferable to reduce
    a. oxidation * b. reduction
    c. sulphation d. all of the above

51. Softening of inconel is obtained by heating the metal at
    a. 1600^0 F b. 1700^0 F
    c. 1800^0 F * d. 1900^0 F

52. Heating time to soften inconel is
a. 5 - 10 minutes b. 10 - 15 minutes *
c. 15 - 20 minutes d. 20 - 25 minutes

53. Physical properties of inconel is
a. ductility * b. hardness
c. brittleness d. all of the above

54. Forging must be done on nickel alloy at
a. 2200^0 F - 1800^0 F b. 2300^0 F - 1850^0 F *
c. 2400^0 F - 1900^0 F d. 2500^0 F - 1800^0 F

55. Rods are formed by
a. hot rolling b. cold rolling
c. both a. or b. * d. none of the above

56. Machining of inconel is difficult and must be done at
a. high speed b. low speed *
c. medium speed d. none

57. Inconel machines uniformly
a. with sulphur base oil b. and does not drag
c. and sticks badly d. all of the above *

58. Welding of inconel provides
a. corrosion resistance b. strength
c. both a. or b. * d. none of the above

59. Welding of nickel alloy is done by
a. electric arc b. electric spot
c. oxyacetylene flame d. all of the above *

60. Oxyactylene welding is used in
a. exhaust manifold b. collectors
c. both a. or b. * d. none of the above

61. For welding an inconel rod,
a. inconel gas welding flux is recommended *
b. monel gas welding flux is recommended
c. iron gas welding flux is recommended
d. carbon gas welding is recommended

62. The inconel joint is also coated with a
a. inconel paste b. water paste *
c. both a. or b. d. none

63. Flame used for inconel welding is ,
a. slightly reducing * b. reducing
c. oxidizing d. carburizing

64. Electric arc welding of a material, heavier than
a. 14 gage is practical b. 16 gage is practical
c. 18 gage is practical * d. 20 gage is practical

65. Welded tubing is produced from strip inconel by automatic
a. oxyacetylene
b. atomic hydrogen welding
c. nitrogen welding
d. both a. or b. *

66. Welded joint of inconel does not require heat treatment to improve
a. strength
b. corrosion resistance *
c. stress
d. strain

67. In silver soldering
a. handy flux is recommonded
b. handy & harman's easy-flo brazing alloy is recommonded
c. both a & b are recommended *
d. none

68. Inconel is corrosion resistance in
a. normal atmosphere b. salt water
c. both * d. none

69. Advantages of iron in inconel are, that there is no
a. trouble with carbide
b. intercrystalline corrosion
c. both a. or b. *
d. none

70. Inconel weld should be cleaned after fabrication by immersing in a
a. 40% b. 50% *
c. 60% d. 70%

71. Inconel is available commercially in the following forms of
a. sheets b. strips
c. rods d. all of the above *

72. In the cold working of inconel which of the following are formed
a. tube b. wire
c. rod d. all of the above *

73. Inconel is suitable for use in the construction of
a. heat exchanger b. jet tail pipe
c. both a. or b. * d. none of the above

74. Properties of inconel are
a. ease of forming and welding
b. strength at high temperature
c. corrosion resistance
d. all of the above *

75. Disadvantage of inconel is
a. more weight than steel *
b. less weight than steel
c. less corrosion resistance
d. all of the above

76. For sealing of exhaust joints
a. inconel-asbestos packings are used *
b. monel asbestos packings are used
c. steel asbestos packings are used
d. iron asbestos packings are used

77. Inconel springs are suitable for use at temperatures
   a. 400^0 - 500^0 F b. 500^0 - 600^0 F
   c. 600^0 - 700^0 F * d. 700^0 - 800^0 F

78. Inconel annealing is accomplished by heating to
   a. 400^0 - 500^0 F b. 525^0 - 650^0 F *
   c. 650^0 - 700^0 F d. 400^0 - 800^0 F

79. Inconel heating time for annealing is
   a. 2 hour b. 3 hour
   c. 1 hour * d. 4 hour

80. Quenching in water contains
   a. 2% denatured alcohol *
   b. 4% denatured alcohol
   c. 5% denatured methanol
   d. 7% denatured methanol

81. Alcohol water quench reduces the
   a. surface oxidation * b. reduction
   c. corrosion properties d. all of the above

82. After quenching, the color of Inconel is
   a. silvery gray b. silvery white *
   c. both a. or b. d. none

83. Soft annealing of material is done by heating to
   a. 1500^0 F b. 1600^0 F
   c. 1700^0 F * d. 1800^0 F

84. Holding time for soft-annealing is
   a. 1 to 3 minutes b. 3 to 7 minutes *
   c. 4 to 8 minutes d. 5 to 9 minutes

85. Monel is similar to
   a. carbon steel b. stainless steel
   c. mild steel * d. all of the above

86. The properties of mild steel are
   a. cupping b. bending
   c. forming d. all of the above *

87. Due to higher elastic limit of monel it requires
   a. greater power for bending & forming *
   b. less power for bending & forming
   c. medium power for bending & forming
   d. no relation with power

88. Hot working such as forging and hot rolling must be done between
   a. 200^0F - 400^0 F b. 400^0F - 800^0 F
   c. 2150^0F - 1850^0 F * d. 2650^0F - 2850^0 F

89. Heating for all high nickel alloys should be done in
   a. iron free atmosphere
   b. sulphur free atmosphere *
   c. calcium free atmosphere
   d. chromium free atmosphere

90. Which are not recommended for offending sulphur contents
   a. coke b. coal
   c. both * d. none

91. Cold-rolled or cold drawn material is obtained by cold working hot rolled material after
   a. pickling b. annealing
   c. drawing d. both a. or b. *

92. Sheet can be bent about a radius equal to
   a. one thickness of the material *
   b. two thickness of the material
   c. three times thickness of the material
   d. none of the above

93. R-monel is available for automatic machine work where
   a. low cutting speed is required
   b. high cutting speed is required *
   c. medium cutting speed is required
   d. all of the above

94. Lubricating oil for boring, drilling is
   a. sulphurized oil * b. hydraulic oil
   c. kerosene d. Av-gasoline

95. Monel can be re-welded with
   a. oxy acetylene b. carbon arc
   c. metallic arc d. all of the above *

96. The welding method to be used, depends on the
   a. gage of material to be joined *
   b. thickness
   c. both a. & b. are correct
   d. none of the above

97. Flame required for monel is
   a. reducing flame b. slightly reducing flame*
   c. neutral flame d. oxidizing flame

98. The metallic arc welding of monel is carried out by using a
   a. flux-coated monel wire *
   b. flux-coated k-monel wire
   c. flux-coated nickel wire
   d. all of the above

99. Soft solder is inherently weak and must not be used where finished equipment will be subject to
   a. vibration b. high stresses
   c. both a. or b. * d. none of the above

100. Generally which type of solder is used
   a. 40 - 60 lead tin b. 50 - 50 lead tin *
   c. 60 - 40 lead tin d. 70 - 30 lead tin

101. For joining monel which type of solder is used
   a. silver solder * b. zine solder
   c. both a. or b. d. none

102. Monel has been used in the manufacture of
   a. oil coolers b. stainers
   c. rivet d. all of the above *

103. K- monel is a
a. ferrous b. non-ferrous *
c. crystaline d. all of the above

104. K- monel composed of
a. nickel b. copper
c. aluminium d. all of the above *

105. K- monel has been very successfully used for
a. gears
b. chains
c. structural member subject to corrosive attack *
d. none of the above

106. K- monel is
a. magnatic b. non-magnatic *
c. no effect d. none

107. Melting point of K- monel is
a. 2400 - 2460^0 F * b. 2300 - 2350^0 F
c. 2400 - 2600^0 F d. 2500 - 2550^0 F

108. Cold rolled, soft material is obtained by
a. hardening
b. softening heat treatment
c. both a. or b. *
d. none

109. The maximum hardness of K- monel is equivalent to about
a. 400 brinell * b. 300 brinell
c. 200 brinell d. 100 brinell

110. Hardness of K- monel is equivalent to about
a. 400 - 500 brinell b. 350 - 400 brinell *
c. 400 - 600 brinell d. 100 - 200 brinell

111. In hardness testing for softest material
a. longer time is required *
b. less time is required
c. as in a and yellow scale is used
d. as in b and green scale is used

112. The material should be cooled not faster than
a. 10^0 F per hour b. 20^0 F per hour
c. 15^0 F per hour * d. 25^0 F per hour

113. Hot working of K- monel should only be done between
a. 1800^0 F - 2100^0 F b. 2175^0 F - 1700^0 F *
c. 1900^0 F - 2000^0 F d. 2300^0 F - 2400^0 F

114. The metal should be quenched in water from finishing at the temperature above
a. 1600^0 F b. 1500^0 F
c. 1700^0 F * d. 1900^0 F

115. Cold-rolled strip or sheet is produced from
a. hot-rolled material b. pickled material
c. cold rolling d. all of the above *

116. Spring wire is cold drawn to
a. 15% of original cross sectional area
b. 20% of original cross sectional area
c. 25% of original cross sectional area
d. 30% of original cross sectional area *

117. Heat treatment of K-monal at 980^o - 1000^0 F will give
a. tensile strength * b. compressive strength
c. bending strength d. all of the above

118. K- monel sheet has been successfully welded by
a. electric arc b. oxyacetylene *
c. both a. or b. d. resistance welding

119. Electric arc welding can be used to weld
a. K- monel * b. monel
c. both a. or b. d. none of the above

120. K- monel is a
a. corrosion resistant *
b. non-corrosion resistant
c. coated material
d. both a. or b.

121. K- monel does not get affected by
a. stress corrosion b. electrolytic corrosion *
c. fretting corrosion d. all of the above

122. The oxides in K- monel can be removed by
a. pickling * b. brushing
c. paints d. all of the above

123. K- monel is commercially available as
a. strip b. wire
c. rod d. all of the above *

124. K- monel is used for
a. instrument parts b. structural parts
c. both a. or b. * d. none of the above

125. Inconel AN - N - 4 is used for
a. wires b. welding rods
c. both above * d. none of the above

■■■

CHAPTER - 35
COPPER ALLOYS

1. Copper alloys are
   a. good electrical conductor with reasonable strength
   b. more stronger and ductile as temperature goes down
   c. capable to retain impact resistance upto -250^0 C temperature
   d. possesing all above qualities *

2. Mark the correct statement for copper alloys
   a. these are easy to be fabricated
   b. can easily be soldered and brazed
   c. some copper alloys can be gas, arc and resistance welded
   d. all above are correct *

3. Copper is only red colour metal with density of
   a. 8.96 gm/cc * b. 6.86 gm/cc
   c. 7 gm/cc d. 10 gm/cc

4. The importance of copper lies mainly
   a. in its very high co-efficient of electrical conductivity
   b. in its thermal conductivity
   c. corrosion resistance
   d. as all above *

5. The main grades of copper used for cast and wrought copper base alloys are
   a. 'cathod' electrolytic
   b. 'fire-refined'
   c. de-oxidised and O_2 free coppers covered with BS-1035-40
   d. all above *

6. Mark the correct statement
   a. bronzes possesses 12% alloying elements
   b. nickel silver is cupronickel with zinc
   c. both above statements are wrong
   d. both a. & b. statements are correct *

7. Brasses are the alloy of copper and zinc upto 45%, with small amount of
   a. Al, Fe, Lead b. Mn, Mg, Ni
   c. phosphorous, tin d. all above *

8. Brasses are classified as
   a. α, β and γ
   b. α, α+β and γ
   c. α, α+β and β *
   d. none of the above

9. Zinc contents in alpha brasses are upto
   a. 30% b. 37% *
   c. 45% d. 50%

10. Alpha brasses posses maximum ductility with zinc contents of
    a. 30% * b. 37%
    c. 45% d. 50%

11. Brasses with 37% contents of zinc are
    a. unsuitable for hot working
    b. used for deep drawing and spinning
    c. subjected to stress corrosion cracking
    d. as above *

12. Alpha brasses are subjected to stress relief annealing at
    a. 300^{0}C b. 250^{0}C *
    c. 200^{0}C d. 350^{0}C

13. Red brass contains copper and zinc as
    a. 85 : 15 * b. 70 : 30
    c. 90 : 10 d. 50 : 50

14. Red brass is used for
    a. condensers
    b. heat exchanger tubes
    c. castings for fuel oil line fittings
    d. all above *

15. Important alpha yellow brass used in marine and aircraft are
    a. cartridge brass, admiralty brass
    b. aluminium brass
    c. tungum brass
    d. all above *

16. Cartridge brass contains copper and zinc as
    a. 70 : 30 * b. 85 : 15
    c. 50 : 50 d. none of the above

17. Cartridge brass with 57% of zinc on 50 mm gage length possess
    a. optimum ductility
    b. best strength
    c. extra spring hard temper
    d. all above *

18. Admiralty brass contain 71 Cu -28 Zn -1 Sn, 1% Sn increases
    a. hardness b. yield strength
    c. corrosion resistance * d. fatigue resistance

19. Aluminium brass contains copper, zinc and aluminium as
    a. 55 : 40 : 5 b. 70 : 25 : 5
    c. 76 : 22 : 2 * d. 68 : 23 : 9

20. Tungum brass contains
a. 84 Cu - 14 Zn - 1 al - 1 Ni *
b. 80 Cu - 14 Zn - 3 al - 3 Ni
c. 76 Cu - 20 Zn - 2 al - 2 Ni
d. none of the above

21. Tungum brass is used for
a. oil pipe lines
b. hydraulic pressure pipe lines *
c. fuel pipe lines
d. all above

22. Mark the correct statement for yellow alpha brass
a. yellow alpha brasses are subjected to dezincification
b. de-zincification causes porosity of non-adherent copper
c. small amount of tin or anti mony minimises de-zincification
d. all above are correct *

23. Alpha-beta brasses contains zinc
a. 20-40% b. 37-46% *
c. 45-60% d. none of the above

24. Alpha-beta brasses are very malleable at temperature range of
a. 400-600^0 C b. 500-700^0 C
c. 600-800^0 C * d. none of the above

25. Alpha-beta brasses are suitable for
a. cold working
b. hot working upto 400 ^{0}C
c. hot working between 600-800^0 C *
d. none of the above

26. Some important alpha-beta brasses are
a. muntz metal, naval brass
b. forging brass
c. high tensile brass
d. all above *

27. Muntz metal contains copper and zinc as
a. 50 : 50 b. 60 : 40 *
c. 65 : 35 d. none of the above

28. Muntz metal possesses quality of
a. batter resistance to sulphur bearing compounds
b. excellant hot forming
c. excellant welding
d. all above *

29. Naval brass (tobin bronze) possesses
a. 60 Cu - 39 Zn - 1 Sn
b. resistance to corrosion in fresh & salt water
c. excellant forgeability
d. all above *

30. Forging brass contains
a. 60 Cu - 38 Zn - 2Pb * b. 55 Cu - 43 Zn - 2 Pb
c. 62 Cu - 36 Zn - 2 SN d. 60 Cu - 38 Zn - 2 SN

31. Forging brass possess best hot working properties of any brass, hence it is used for
a. hot forgings
b. hard ware gears
c. automatic screw machines
d. all above *

32. High tensile brass contains apart from 60 Cu - 40 Zn additional elements to improve the mechanical properties, such as
a. al 1.5%, manganese 1%
b. iron 1% and nickel
c. lead for free machinability
d. all mentioned in a., b. & c. *

33. The high tensile brass possesses the strength value in the range of
a. 350-450 MPa b. 460-740 MPa *
c. 640-850 MPa d. none of the above

34. High tensile brass is used for
a. forging b. castings
c. extrusions d. all above *

35. Bronzes are stronger than brasses and are alloys of copper with
a. al, si, be
b. Cr, P
c. Pb, Zn
d. all or without some as per a., b. & c. *

36. Bronzes possesses the qualities of
a. excellant corrosion resistance
b. bearing
c. soldered and welded in work hardened conditions
d. all above *

37. Bronzes are classified as
a. wrought b. cast
c. both * d. none

38. Mark the correct statement
a. wrought bronzes are for cold working
b. cast bronzes are used for bearing
c. both above are correct *
d. both above are not correct

39. Wrought bronze alloys usually does not contain tin more than
a. 14% * b. 8%
c. 12% d. 10%

40. Cast bronze alloys
a. contains 10% and 18% tin *
b. lower melting point
c. are composed of hard particle with soft matrix
d. are as mentioned in a, b. & c.

41. Bearing materials usually contains tin, between
a. 5 to 8% b. 8 to 12% *
c. 10 to 15% d. none of the above

42. Tin bronzes are
   a. referred to as phosphor bronzes
   b. possessing phosphorus as de-oxidiser
   c. as above *
   d. not referred as phosphor bronzes

43. In tin bronzes, the usual range of content of
   a. phosphorous is between 0.01 and 0.5%
   b. tin is between 1.0 and 11.0%
   c. both above statements are correct *
   d. both above statements are wrong

44. Phosphorous in tin bronzes
   a. reduces the co-efficient of friction
   b. reduces the ductility
   c. does both as above *
   d. increases the ductility

45. If 2 to 6% zinc is added in lieu of phosphorous in tin bronze, then it becomes
   a. muntz metal
   b. white metal
   c. gun metal *
   d. none of above

46. Zinc in tin bronze
   a. act as oxidiser
   b. improves casting qualities
   c. improves bearing properties
   d. does all above *

47. Typical alloy admiralty gun metal contains
   a. 88 Cu - 10 Sn - 2 Zn *
   b. 70 Cu - 28 Sn - 2 Zn
   c. 80 Cu - 15 Sn - 5 Zn
   d. any of the above

48. Mark the correct statement
   a. lead is added in tin bronze by 5-25% wt.
   b. leaded bronze is used for bearings with insufficient lubrication
   c. both statements are correct *
   d. both statements are not correct

49. Cold working wrought alloys usually contains aluminium in quantities
   a. 5% *
   b. 10%
   c. 15%
   d. 20%

50. Aluminium bronzes are
   a. malleable
   b. ductile
   b. homogeneous
   d. all above *

51. Cast aluminium bronzes contains approximatly 10% aluminium at temperatures above
   a. 500^0 C
   b. 650^0 C
   c. 565^0 C *
   d. 550^0 C

52. Slow cooling of cast aluminium bronze produces
   a. coarse lammellar structure *
   b. fine lammellar structure
   c. no changes in lammellar structure
   d. ductility

53. Rapid cooling cast aluminium bronze produces
   a. fine grained structure
   b. improved toughness
   c. both above *
   d. nothing above

54. The addition of 2% iron to aluminium bronze cast alloy
   a. retards β to γ_2 transformation
   b. produces resistant to oxidation and scaling
   c. produces resistant to all forms of corrosion
   d. induces all above qualitites *

55. Al-bronze with 2% of iron posses
   a. good mechanical properties at 300^0 C temperature
   b. strength of 870 MPa after cold work to 80% reduction
   c. both above qualities *
   d. strength of 600 MPa after cold work to 80% reduction

56. Copper-Beryllium bronze is
   a. a high strength, precipitation hardenable
   b. non-magnetic alloy
   c. containing beryllium in the range of 1 to 2.25%
   d. as all above *

57. Mark the correct statement for Cu-be bronze
   a. optimum properties are obtained with 2% be
   b. heat treated with quench from solution temperature of 800^0 C
   c. ageing is done at 300-320^0 C during quenching process
   d. all above statements are correct *

58. High strength is obtained from copper beryllium bronze by
   a. heat treatment
   b. cold work
   c. precipitation treatment
   d. all above *

59. Beryllium bronze with combination of heat treatment, cold work and precipitation treatment, produces very high strength of
   a. 1200 MPa
   b. 1540 MPa *
   c. 1450 MPa
   d. 1750 Mpa

60. Beryllium bronze is used where
   a. combination of formability and high yield strength required
   b. light fatigue strength and resistance to corrosion required
   c. relatively high electrical conductivity required
   d. all above is required *

61. Copper nickel alloys possess, especially
   a. high corrosion resistance
   b. high heat resistance
   c. high fatigue resistance
   d. as per a. & b. *

62. Mark the correct statement
    a. copper nickel alloys are sufficiantly ductille
    b. Cu.ni alloys can be hot worked as well as cold worked
    c. Cu.ni alloys are produced in the form of strips, rods and wires
    d. all above are correct *

63. Melchor is a copper alloy with 20% of
    a. chromium b. aluminium
    c. nickel * d. zinc

64. Melchor is a high corrosion resistance copper and is suitable for working at high temperatures in
    a. steam medium
    b. in fresh water
    c. sea water
    d. all above mediums *

65. Mark the correct statement
    a. melchor is used to make sieves and condenser tubes
    b. melchor is used at high pressures and temperatures
    c. melchor tubes are used where copper and brass tubes can't be used
    d. all above statements are correct *

66. Copper nickel alloy ' Melchor'
    a. has excellant weldability
    b. has reasonably good formability
    c. can be hot as well as cold formed
    d. possess all above qualities *

67. German silver is the alloy of
    a. copper-zinc-nickel * b. copper-aluminium-zinc
    c. copper-tin-zinc d. copper-nickel-tin

68. German silver possess
    a. poor corrosion resistance
    b. high corrosion resistance
    c. ductility to work at room temperature
    d. as per b. & c. *

69. German silver give good corrosion resistance to
    a. food chemicals b. water
    c. atmosphere d. all above *

70. Mark the correct statement
    a. german silver containing over 60% copper is single phase alloy
    b. german silver containing 50-60% copper are two phase alloys
    c. german silver of two phase alloy have high modulus of elasticity
    d. all above statements are correct *

71. German silver
    a. can readily be hot worked
    b. less susceptible to stress corrosion cracking
    c. possess both above qualities *
    d. is more prone to stress corrosion

72. Monel contains
    a. Cu 60% - Fe 2.3% - ni 37%
    b. ni 70% - Fe 3% - Mn 1.5 - Cu 24.5% *
    c. Cu 50% - ni 40% - Mn 10%
    d. none of the above

73. Monel possess good
    a. toughness
    b. fatigue strength
    c. temperature resistance
    d. qualities mentioned in a., b. & c. *

74. When monel is used, its contact with less noble metal is avoided, because
    a. monel will get contaminated
    b. the fumes formed will corrode less noble metal *
    c. the fumes formed will corrode monel
    d. of different co-efficient of temperatures

75. Monel is used where
    a. toughness and ftigue strength is required
    b. corrosion resistance is required
    c. elevated temperatures are present
    d. all above condition exists *

76. Mechanical alloying, to strengthen the copper, is done by
    a. dispersion of stable particles in the copper matrix
    b. using copper and elements, such as Cr, Nb, Mo etc, refinement of second phase particles can be obtained
    c. both above processes *
    d. none of the above process

77. Studies showed for mechanical alloying, that
    a. good refinement for niobium *
    b. intermediate refinement for chromium & ranadium
    c. poor refinement for molybednum and tungsten
    d. all above

78. High strength in niobium alloys at higher temperature is due to
    a. reduced solubility of niobium in copper
    b. reduced diffusivity of niobium in copper
    c. both above conditions *
    d. none of the above

79. Strength increases by mechanical alloying due to
    a. 'Orowan strengthening'
    b. as in a, due to difficulty of dislocation in by passing the dispersoid particles *
    c. both above
    d. proper heat treatment

80. Spinodal decomposition method of strengthening is adopted for copper alloys of
    a. Cu-al-Cr
    b. Cu-Cr-Mo
    c. cupronickel *
    d. none of the above

81. Spinodal decomposition structure can be formed on those copper alloys which
   a. exhibit miscibility gap
   b. atoms of components metal possess mobility at heat treated temperatures
   c. have above qualities *
   d. contains high percentage of molybednum

82. Spinodal structures are formed by
   a. heating the alloy above the miscibility gap to homogenise
   b. as in a, cooled rapidly with in miscibility gap temperatures
   c. decomposition at a rate controlled by diffusion rate of two metals
   d. as above *

83. Addition of zinc in copper alloys
   a. reduces the cost *
   b. improves corrosion resistance
   c. increases the cost
   d. increases the yield strength

84. Tin is added to brasses to
   a. significantly increase the strength
   b. resist the de-zincification
   c. obtain both above *
   d. obtain ductility

85. To inhibit de-zincification in brasses, small amount of _____________ added.
   a. arsenic b. antimony
   c. phosphorous d. any of the above *

86. Addition of aluminium in copper alloys
   a. forms al oxide film on alloy
   b. resists impingement corrosion due to turbulant sea water
   c. performs both above functions *
   d. induces brittleness

87. Aluminium bronzes containing al 5 to 12% posses
   a. excellent resistance to impingement corrosion
   b. superior mechanical properties at elevated temperatures
   c. both above qualities *
   d. none of the above qualities

88. Addition of nickel to copper
   a. increases resistance to velocity and impingement attack
   b. increases resistance to corrosion by sea water
   c. strengthen alloys to face aggresive sea water environments
   d. produces all above qualities *

89. Melting temperature of copper alloys are considerably high, their tapping temperature are often as high as
   a. 900^0 C b. 1000^0 C
   c. 1225^0 C d. 1325^0 C *

90. Molten copper alloys
   a. behaves much like ferrous alloys
   b. are susceptible to contamination from refractories
   c. gets affected by atmosphere
   d. is as all above *

91. Copper alloy melting requires the speed to minimise
   a. cost
   b. contamination from atmosphere
   c. vaporisation of volatile alloying element
   d. all above *

92. For ideal melting procedure
   a. furnace temperature and atmosphere to be controlled
   b. furnace should be cleaned of slag and gas/air ratio controlled
   c. fuel fired furnace should be at red heat before charging
   d. all above is required *

93. Usually four types of furnaces are used for melting copper alloys i.e.
   a. crucible, blast, cupola & reverberatory
   b. crucible, reverberatory, induction and arc *
   c. blast, induction, crucible and arc
   d. crucible, reverberatory, cupola and induction

94. Crucible furnaces are of
   a. lift out type b. tilting type
   c. both above type * d. open flame type

95. In lift out crucible furnaces, at the end of melting cycle, the crucible
   a. is lifted out by means of tongs
   b. is used as pouring laddle
   c. is lifted by hoist
   d. is used as a. & b. *

96. Lift out crucible furnaces are
   a. well adapted to alloy changes by use of different crucibles
   b. well suited for small quantity productions
   c. with minimum maintenance cost
   d. as above *

97. Lift out crucible furnaces are
   a. unsuitable for large productions
   b. not adoptable for mechanised foundry operations
   c. with capacity from 35 to 550 kgs.
   d. as above *

98. Mark the correct statement
   a. life of crucibles are small because of extreme temperatures
   b. usually capacity of lift out crucibles does not exceed 135 kg
   c. crucible furnaces are most suitable for large productions
   d. statements a. & b. are correct *

99. Tilting crucible furnaces are available in the capacity of
    a. 100-1500 kgs b. 175 to 1300 kgs
    c. 135-1350 kgs * d. 200 to 2000 kgs

100. Tilting crucible furnaces are piveted at
    a. bottom b. centeral axis
    c. axis at pouring tip d. both places as b. & c. *

101. The advantage of tip axis tilting is that
    a. while pouring, stream of melt is in fixed position
    b. position of laddle, need not to be shifted while pouring
    c. both above *
    d. melt can be poured at various positions

102. Mark the correct statement
    a. tilting crucible has longer life
    b. tilting crucible is hydraulically operated
    c. both above are correct *
    d. tilting crucibles are manually operated

103. Reverberatory furnaces are of
    a. open flame fuel fired *
    b. electrical resistance type
    c. charcol type
    d. none of the above

104. Fuel burners, in tilted reverberatory furnaces, are placed at the same side of exhaust, for
    a. increased thermal efficiency
    b. as in a, because exhaust gas return across the surface of melt
    c. both above purposes *
    d. none of the above reasons

105. In reverberatory furnace, charge is melted by
    a. direct flame
    b. radiation from hot wall & roof *
    c. convection
    d. b. & c. processes

106. For melting copper alloys most oftenly used are
    a. lift out crucible furnace
    b. fixed reverberatory furnace
    c. tilted reverberatory furnace *
    d. all above

107. Induction furnaces are
    a. core type
    b. coreless type
    c. both above *
    d. none of the above

108. Mark the correct statement
    a. core type induction furnaces uses low frequency
    b. coreless furnaces uses low & high frequencies
    c. both types of furnaces uses high frequencies
    d. statements a. & b. are correct *

109. Advantages of induction furnaces are
    a. these are clean and easy to control
    b. these does not contaminate the melt
    c. these ensures homogeneous composition with uniform temperature
    d. all above *

110. In a core induction furnace
    a. a channel of molten metal acts as a shorted loop coupled as step down transforms
    b. heat from metal in loop is transfered to charge
    c. for loop, metal is melted seperatly for start up
    d. all above happens *

111. Core induction furnaces consumes/perton
    a. relatively less power *
    b. relatively more power
    c. power same as coreless
    d. very heavy power

112. The greatest disadvantage of core induction furnaces are
    a. these consumes heavy power
    b. that a molten heel must be kept in the furnace all the time
    c. metal to be melted seperately for start up
    d. as b. & c. *

113. In coreless furnaces
    a. charge is surrounded by induction coil
    b. charge/crucible act as secondary coil
    c. both above are correct *
    d. charge itself act as induction coil

114. After melting, in coreless furnaces
    a. the coil and shell is lifted off
    b. crucible is used as pouring laddle
    c. both above are true *
    d. both above are wrong

115. Indirect arc furnaces are for
    a. low productions
    b. high productions *
    c. melting aluminium bronzes only
    d. none of the above

116. Indirect arc furnace consists of electrodes made of
    a. iron carbide b. tungsten
    c. graphite * d. any of the above

117. Heat is transfered to the charge in indirect arc furnace
    a. by direct radiation from the arc
    b. from radiation from the lining
    c. by conduction to molten charge
    d. by all above ways *

118. The disadvantages of indirect arc furnace are
    a. vaporisation alloying element due to high temperature
    b. difficulty in temperature control of melt
    c. excessive electrodes and power consumptions
    d. as per a. & b. *

119. Indirect arc furnaces are rocked horigentally for
   a. faster melting
   b. homogeneous melt
   c. minimising wear of refrectories
   d. all above *

120. Melting of aluminium bronzes in indirect arc furnaces are not recommanded because of
   a. the excessive dross formation
   b. high zinc alloys are subjected to loss of zinc by volatilisation
   c. both above reasons *
   d. low melting temperature of aluminium

121. Copper alloy castings are produced by
   a. sand, shell, investment
   b. plaster, ceramic
   c. permanent mold & die casting
   d. all above *

122. For sound castings
   a. melting temperature is important
   b. mold temperature is important
   c. pouring temperature is most important *
   d. all above temperatures are important

123. For casting with miniumum thickness, the metal is poured at temperature
   a. lower side of the range
   b. near higher side of range *
   c. mid of range
   d. any range

124. Casting process also influences the pouring temperature of alloy, for example
   a. higher temperature range is selected for fine finish
   b. lower temperature range is prefered for the life of die *
   c. highest temperature is preferred for thin die castings
   d. pouring temperature is relevant for die casting

125. Leaded tin bronzes have pouring temperature range of
   a. $1200\text{-}1250^0C$ b. $1065\text{-}1260^0C$ *
   c. $1010\text{-}1230^0C$ d. none of the above

126. Heavy leaded tin bronze have pouring temperature range of
   a. $1200\text{-}1250^0C$ b. $1065\text{-}1260^0C$
   c. $1010\text{-}1230^0C$ * d. $1250\text{-}1300^0C$

127. Lead red brasses have pouring temperature range of
   a. $1060\text{-}1285^0C$ * b. $1200\text{-}1300^0C$
   c. $1130\text{-}1270^0C$ d. $1000\text{-}1150^0C$

128. Aluminium bronze have pouring temperature range of
   a. $1000\text{-}1100^0C$ b. $1100\text{-}1200^0C$ *
   c. $1200\text{-}1300^0C$ d. none of the above

129. Beryllium bronze has pouring temperature range of
   a. $1010\text{-}1230^0C$ * b. $1110\text{-}1330^0C$
   c. $1100\text{-}1200^0C$ d. $1200\text{-}1300^0C$

130. The method of measuring the pouring temperature is by
   a. thermometer
   b. thermocouple
   c. pyrometer with caliberated thermocouple *
   d. all above

131. Metal poured with high temperature induces
   a. brittleness in casting
   b. gas porosity in casting *
   c. strength in casting
   d. ductility in casting

132. Gas porosity in castings is caused due to
   a. low temperature melt pouring
   b. high temperature melt pouring *
   c. both above reasons
   d. none of the above reasons

133. Many copper alloys have serious internal shrinkage, due to
   a. too cold pouring b. too hot pouring *
   c. excessive cold mold d. too hot a mold

134. In sand castings, pouring at too high a temperature, causes
   a. reaction of core sand with metal
   b. break down of binder in the sand
   c. produces steam or core gases
   d. all above *

135. Sand castings is the most flexible method in terms of
   a. casting size
   b. shape
   c. adaptability to wide varieties
   d. all above *

136. In sand castings
   a. dimensional accuracies are high
   b. dimensional accuracies are poor
   c. surface finish is rougher
   d. b. & c. are negative effects *

137. For moulding, the sand selected is
   a. special
   b. natural, fine or coarse
   c. according to type of casting
   d. as per b. & c. *

138. Mark the correct statement
   a. fine sand mold provides best surface conditions
   b. fine sand molds does not provide internal soundness
   c. coarse sand molds provides rougher surface but batter internal soundness
   d. all above statements are correct *

139. Synethetic sand is used to
   a. overcome the deficencies of natural sand
   b. minimise the clay and water requirements
   c. produce stong bond
   d. obtain all above *

140. With synthetic sand mold
a. requires less ramming
b. requires less squeezing
c. dense mold is produced
d. all above is required *

141. Synthetic sand consists of additions, such as
a. cereal
b. wood flour
c. cellulose and sea coal
d. all above *

142. For sand molds, bonding clays used are
a. bentonites b. fire clay
c. both above * d. none of the above

143. Bentonites when used 2 to 5%, results in
a. high green strength
b. good formability
c. acceptable hot strength
d. all above *

144. When bentonites is used above 5% by weight, it results in
a. excessive hot strength
b. hot tears and cracks in castings
c. both above *
d. nothing above

145. Fire clay is oftenly used as bulking agent in natural sand, reduces
a. thermal defects * b. hot strength
c. tears and cracks d. none of the above

146. Fire clay can be used upto which permeability of the mold is not affected
a. 5% b. 8% *
c. 10% d. 15%

147. For close dimensional control, copper alloys can be cast successfully by
a. natural sand molding
b. synethic sand molding
c. shell mould casting *
d. all above

148. High volume productions with low cost and smooth surface can be obtained by
a. natural sand mould
b. synthetic sand mould
c. shell mould *
d. all above

149. Shell mould and cavities are made from
a. natural sands b. silica sands *
c. synthetic sands d. all above

150. Copper alloys, can be casted successfully in plaster mould, which contains lead
a. less than 5% * b. more than 5%
c. nill d. above 10%

151. Copper alloys with lead contents above 5% are not suitable for plaster moulding because
a. lead react with mould composition
b. of poor fluidity of lead
c. of both above *
d. pouring temperature of lead is very high

152. A plaster mould will be destroyed, if heated above
a. 1425^0C * b. 1200^0C
c. 1550^0C d. none of the above

153. The permanant mould casting is best suited to the castings of
a. tin, silicon, aluminium
b. manganese bronzes
c. yellow brasses
d. all above *

154. The only disadvantages of permanent mould casting is
a. labour cost b. rougher finishes
c. tooling cost * d. porosity in castings

155. Permanent moulds are usually made from
a. synthetic sands b. wrought iron
c. grey cast iron * d. all above

156. To improve the high temperature properties of mould metal varying amount of ___________ is added in iron
a. nickel b. chromium
c. molybednum d. all above *

157. In permanent moulds, re-usage cores are made of
a. same material of mould
b. tool steel
c. sand
d. as a. & b. *

158. In permanent moulds, expandable cores are made of
a. grey cast iron
b. tool steel
c. sand , plaster , graphite *
d. all above

159. Mold temperature for copper alloys in permanent moulds ranges from
a. 100-200^0C b. 120-370^0C *
c. 170-347^0C d. none

160. Permanent mold casting are coated with
a. coats which adheres tight and permit various castings
b. coats which flakes out with each casting
c. both above types *
d. permanent metallic coat

161. The mould coating which flakes with each casting is prefered in
a. beryllium bronzes
b. aluminium bronzes
c. manganese bronzes
d. tin bronze alloys with phosphorous *

162. The mould coatings which flakes with each casting is preffered for tin bronzes, with phosphorous because
 a. a coating that flake provides venting mould cavity
 b. such a coating is usually porous
 c. such coatings permit metal to tie quiety against mould surface
 d. of all above *

163. In copper alloys, best suited for die casting is
 a. red brass b. manganese bronze
 c. yellow brass * d. aluminium bronze

164. The advantages of die casting of copper alloys are
 a. close dimensional control
 b. good surface
 c. high rate of production
 d. all above *

165. The main limitation in die casting copper alloy is
 a. porous casting b. short die life *
 c. surface cracks d. all above

166. The dies to cast copper alloys are made of
 a. cast iron
 b. high speed steel
 c. tungsten tool steels *
 d. any of the above

167. The rotating components for copper alloy die castings which are not exposed to molten metal are made of
 a. cast iron b. high speed steels
 c. tungsten tool steel d. alloy steels *

168. The optimum die and core temperature vary from
 a. 215-640^{0}C b. 315-700^{0}C *
 c. 350-715^{0}C d. 390-630^{0}C

169. To control the temperature in copper alloy die castings
 a. water is circulated through cores and dies
 b. oil is circulated through cores and dies
 c. water or oil is circulated through cores and dies *
 d. no coolant is used

170. Very little lubricant is used for copper alloy diecasting, because
 a. lubricant burns into casting
 b. excessive lubrication causes defect in castings
 c. of both above *
 d. there is no release problem from dies

171. For copper alloy die castings, lubricant is used on
 a. plunges
 b. sprues
 c. at spots where release is problem
 d. all above locations

172. Lubricant used for copper alloy castings is
 a. mixture of oil and graphite *
 b. synthetic oil
 c. greese
 d. mineral oil

173. Most extrudable of copper and copper alloys is
 a. oxigen free copper *
 b. lead containing less than 1.25%
 c. beryllium bronze
 d. all above

174. Cold extruding is also performed on most of copper alloys such as
 a. cartridge bronze
 b. alloys containing lead below 1.25%
 c. both above *
 d. aluminium silicon bronze

175. Pressure required to extrude cartridge brass, for a given area is
 a. more than mild steel
 b. less than mild steel *
 c. equal to mild steel
 d. much more than mild steel

176. For copper alloys, extruding pressure, then aluminium alloy is
 a. two to three times less
 b. two to three times more *
 c. four times
 d. equal

177. The length of a backward extruded section is limited by
 a. length to dia, ratio b. extruding pressure
 c. both above * d. none of the above

178. Length to dia. ratio to determine length of a backward extruded section for copper alloy is
 a. 5 : 1 * b. 10 : 1
 c. 15 : 1 d. 20 : 1

179. Length to dia. ratio to determine length of backward extruded section for aluminium alloy is
 a. 5 : 1 b. 10 : 1 *
 c. 15 : 1 d. 20 : 1

180. The total reduction area for copper or copper alloys, under best conditions should not exceed
 a. 80% b. 85%
 c. 93% * d. 98%

181. Most forgeable copper alloy, forging brass can be forged by applying
 a. much less force
 b. appriciably high force
 c. force equal to low carbon steel
 d. with one or two blows in a finishing die *

182. The aluminium bronze can be forged with force
 a. less than low carbon steel forging
 b. more than low carbon steel forging
 c. equal to low carbon steel forging *
 d. much higher than mild steel forging

183. Most copper alloys are forged by closed dies and sequence followed is same as
 a. aluminium b. magnesium
 c. steel * d. all above

184. Sequence followed for copper alloy forging in closed die, is
 a. fullering, blocking and finishing *
 b. fullering, finishing and blocking
 c. blocking, finishing and fullering
 d. blocking, finishing and fullering

185. Most forgeable copper alloy is
 a. al bronze b. naval bronze
 c. Mn-al-bronze d. forging brass *

186. Least forgeable copper alloy is
 a. Mn-bronze b. Al-bronze *
 c. Mn-Si bronze d. none of above

187. The lowest forging temperature for some copper alloy is
 a. 590^0 C * b. 620^0 C
 c. 650^0 C d. 730^0 C

188. Highest forging temperature for some copper alloy is
 a. 700^0 C b. 730^0 C
 c. 870^0 C d. 900^0 C *

189. Some copper alloys can not be forged significantly such as
 a. red brass
 b. leaded copper zinc alloys
 c. architechtural bronze with lead contents above 2.5%
 d. mentioned in b. & c. *

190. Lead in copper alloys
 a. improves metal flow
 b. promotes crack during forging
 c. does as both above *
 d. does nothing as above

191. Even 10% of lead contents in alpha brass(70 Cu 30 Cu) will induce
 a. batter forgeability
 b. catastrophic cracking while forging *
 c. excellant forgeability
 d. absolute unforgeability

192. Cupronickel alloys are
 a. easily forged
 b. forged with difficulty
 c. forged with high controlled temperature
 d. forged as b. & c. *

193. Silicon bronzes
 a. easy to forge
 b. difficult to forge
 c. causes rapid deterioration of dies
 d. are as said in b. & c. *

194. The types of heat treatment given to copper alloy are
 a. homogenisation annealing
 b. stress relieving
 c. precipitation hardening (ageing)
 d. all above *

195. Homogenisation treatment is given to
 a. high tin phosphor bronzes
 b. silicon bronzes
 c. cupronickles
 d. all above *

196. Homogenisation temperatures for copper alloys are in the range of
 a. 700-825^0 C b. 800-925^0 C *
 c. 600-800^0 C d. none of the above

197. The maximum annealing temperature for wrought copper is
 a. 550^0 C b. 650^0 C *
 c. 700^0 C d. 750^0 C

198. The wrought copper which can be annealed by heating as low as 260^0 C is
 a. oxigen free copper
 b. electrolytic Tough Pitch *
 c. de-oxidised high residual phosphor copper
 d. none of the above

199. Minimum annealing temperatures of most of the wrought copper alloys are in the range of
 a. 400-600^0 C b. 425-565^0 C
 c. 425-650^0 C * d. none of the above

200. Most of the wrought copper alloy can be annealed with maximum temperature range of
 a. 600-785^0 C * b. 650 to 800^0 C
 c. 600-700^0 C d. none of the above

201. Beryllium bronze is only the copper alloy which need very high temperature for annealing in the range of
 a. 800-1200^0 C b. 900-1100^0 C
 c. 775-1035^0 C * d. none of the above

202. Three copper alloys which have identical annealing temperatures are
 a. red, yellow and cartridge brass
 b. munz metal, naval and admirlty brass *
 c. forzing, phosphor and red brass
 d. none of the above

203. For copper alloys, stress relieving is done by heating, for
 a. 1 hour * b. 2 hours
 c. 3 hours d. 4 hours

204. Stress relieving of copper alloy is done by heating for one hour, depending upon the alloy, in the temperature range of
 a. 245-285^0 C b. 200-285^0 C *
 c. 240-350^0 C d. none of the above

205. Joining is the process to produce the usefull articles which
   a. can not be fabricated economically by other methods
   b. requires joining copper alloys and its parts for assembly
   c. needs joining, bonding and assembly techniques
   d. have all above requirements *

206. Copper alloys have
   a. high thermal conductivity
   b. high co-efficient of expansion and contraction
   c. low co-efficient of expansion
   d. as mentioned in a. & b. *

207. Copper alloys, for welding needs
   a. pre-heating b. greater joining spacing
   c. both above * d. nothing above

208. The old methods of oxy-acytelen and shielded arc welding have been replaced, presently by
   a. resistance welding b. tungsten inert-gas
   c. metal inert gas d. as in b. & c. *

209. Selection between MIG and TIG for copper alloy welding is determined by, primary criterian of
   a. composition of alloy b. metal thickness
   c. lead contents d. all above *

210. Copper alloys welding, with metal thickness upto 1.5 mm needs
   a. pre-heating
   b. no pre-heating
   c. tungsten electrode of less than 1.5 mm dia.
   d. as per b. & c. *

211. Copper alloy with metal thickness of 25 mm needs to be pre-heated at high temperature as of
   a. 300^0 C b. 250^0 C
   c. 400^0 C * d. 100^0 C

212. For inert gas welding of copper base alloys of 1.5 mm needs
   a. 25.26 volt with 100-165 amp. power
   b. 250-260 volts with 100-165 amp. power
   c. Cu-Si welding rod
   d. as per a. and c. *

213. Copper alloys upto 12 mm thickness are inert gas welded with
   a. Cu-Si welding rod *
   b. Cu-Ni welding rod
   c. Cu- Be welding rod
   d. any of the above

214. Copper beryllium alloy with 25 mm thickness is inert gas welded by using
   a. 34-35 volts with 400-500 amps power *
   b. 29-30 volts with 250-400 amps power
   c. 33-40 volts with 400-500 amps power

215. For Cu-Be alloy inert gas welding, the welding rod used is of
   a. Cu-Si b. Cu-Ni
   c. Cu-Be * d. none of the above

216. Brazing is the effective means of joining copper alloys, it is done in temperature range of
   a. 750^0 C to 1200^0 C
   b. 625^0 C to 1090^0 C *
   c. 800^0 C to 900^0 C
   d. none of the above

217. Drawbacks of brazing are
   a. softening of brazed metal
   b. high cost of low temperature filler metal
   c. requirement of controlled atmosphere for low cost filler metal
   d. all above *

218. For brazing the copper alloys
   a. flux is always required
   b. joint clearances of 0.025 to 0.125 mm is used
   c. with both above, strong and sound joint is made
   d. all above are correct *

219. For soldering copper alloys, the solder used, consists of
   a. 60% lead and 40% tin
   b. 40% lead and 60% tin *
   c. 70% lead and 30% tin
   d. 50% lead and 50% tin

220. The eutectic composition of lead and tin is with
   a. tin 40% lead 60%
   b. tin 63% lead 37% *
   c. tin 57% lead 43%
   d. none of the above

221. Solder with eutectic composition has melting temperature well below the lead, i.e.
   a. 195^0 C b. 183^0 C *
   c. 200^0 C d. none of the above

222. Dip and wave soldering for electronic assemblies is done with
   a. Ti 65 Pb 35 at 183-185^0 C *
   b. Ti 60 Pb 40 at 183-188^0 C
   c. Ti 50 Pb 50 at 183-204^0 C
   d. Ti 50 Pb 48.5 and Cu 1.5 at 183-215^0 C

223. With tin contents 95% and Pb of 5% melting temperature of solder increases to the range of
   a. 185-275^0 C b. 236-243^0 C *
   c. 296-301^0 C d. none of the above

224. Solder made without tin with Pb 97.5 and Ag 2.5 the melting temperature increases to the range of
   a. 296-301^0 C b. 305^0 C *
   c. 365^0 C d. 301^0 C

225. The highest melting temperature range of 304-365^0 C is for the solders which contains
a. Pb 94.5, Ag 5.5 * b. Pb 80, Ag 20
c. Pb 92, Ag 8 d. none of the above

226. The lead rich alloys have ___________ melting properties
a. inferior * b. superior
c. above average d. excellant

227. For soldering fluxes functions as
a. cleaner and protector of surfaces
b. to improve wetting
c. to expose the surface for bonding by the solder
d. all above *

228. Usually the basic type of fluxes used for soldering are
a. chloride or acid type b. organic type
c. rosin or resin type d. all above type *

229. For good soldering, as per applicability
a. choose correct flux
b. choose correct solder
c. warm the surface for good wetting
d. do all above *

230. Soldering with soldering iron is
a. for small parts b. slow process
c. high volume rate d. as said in a. & b. *

231. Though dip and wave soldering is good for large productions, but have its drawbacks as
a. solder contamination
b. critical adjustments
c. high cost
d. a. & b. *

232. Flame soldering have drawbacks of overheating with little control of solder flow, but is useful for its
a. large productions b. portability
c. both above * d. none of the above

233. Soldering by induction heating enables
a. large productions b. localised heat control
c. quality joints d. all above *

234. Electrical resistance soldering performed for
a. small parts
b. large parts
c. those parts, unsuited to other methods
d. a. and c. *

235. Though it is expensive to set up but for large complicated and mass production the soldering method adopted is
a. dip soldering
b. induction heating
c. oven heating *
d. open flame

236. Mark the incorrect statement for ultrasonic method of soldering
a. organic flux is used *
b. used for small area without lap or crimp joints
c. removed surface oxides
d. no flux is required

237. Alpha brasses are usually used for
a. fire extinguishers
b. radiator and heat exchangers
c. pickling crates
d. all above *

238. Cartridge brass is used for
a. radiator cores and tanks
b. ammunition components
c. rivets, springs, hings etc.
d. all above *

239. Condensers and strainers are usually made of
a. cartridge brass b. aluminium brass
c. admiralty brass * d. tungum brass

240. For marine applications, the brass used is
a. red brass b. cartridge brass
c. aluminium brass * d. none of the above

241. Tungum brass is specially used for
a. aircraft low and high pressure tubes *
b. ammunition components
c. condensers
d. marine applications

242. Brazing rods for copper alloy and cast iron are made of
a. naval brass b. high tensile brass
c. muntz metal * d. all above

243. Naval brass is commonly used for making
a. turnbuckle barrels
b. propellar shafts
c. valve stems and welding rods
d. all above *

244. Rods for forging, casting and extrusions are made of
a. muntz metal b. naval brass
c. high tensile brass * d. none of the above

245. Tin bronzes are used to satisfy the requirements of
a. severe compressions
b. extra spring qualities
c. greatest resilience
d. all above *

246. Single phase aluminium bronzes are most suitable for
a. condenser tubes
b. corrosion resistance vessels
c. protective sheathing in marine applications
d. all above *

247. Two phase aluminium bronzes are used to make
   a. bushings and bearings
   b. non-sparking tool and dies
   c. hot stamping, extrusion, rolled products and castings
   d. all above *

248. For excellant formality, high yield strength, creep and corrosion resistance and high electrical conductivity, the bronzes are used
   a. tin bronze
   b. single phase al. bronze
   c. two phase al. bronze
   d. beryllium bronze *

249. Beryllium bronzes are used to make
   a. surgical instruments
   b. diaphragms
   c. dies, non-sparking tools and fitting pins etc.
   d. all above *

250. The brand names for copper-nickel alloys are
   a. melchor, inconel and german silver
   b. monel, muntz metal and melchor
   c. melchor, german silver and monel *
   d. none of the above

251. Melchor is used to make
   a. communication relays
   b. condenser plates & resisters
   c. electrical springs
   d. all above *

252. To work in damp atmospheres the most suitable copper nickel alloy is
   a. melchor   b. german silver *
   c. monel   d. all above

253. German silver is used to make
   a. rivets, screws, truss wire
   b. camera parts, core bars
   c. radio dials and name plates
   d. all above *

254. Application of monel alloy is required to work in aggressive medias like
   a. steam
   b. salt solutions
   c. alkalies and acids
   d. as mentioned in a., b. & c. *

255. POC 5-25 is a leaded bronze with 4-6% tin, it is used to make
   a. inlet and exhaust valves of piston engines
   b. air valves of air seperator assembly *
   c. pressure relief valves
   d. all above

256. POC 5-25 copper alloy is developed by
   a. HAL Bangalore   b. HAL Nasik
   c. HAL Koraput *   d. all above

257. The composition of POC 5-25 copper alloy contains
   a. Su-Pb-Fe-Al-Si   b. Ni-Sb-P-Zn
   c. both above *   d. Sn-Si-Ag-Cr-Mo-Co

258. POC 5-25 copper alloy possess density of
   a. 8.6 g/cm^3 b. 9.2 g/cm^3 *
   c. 10 g/cm^3 d. 8.5 g/cm^3

259. Cold rolled copper sheet grade (ETP) electrolytic Tough Pitch copper is
   a. composite alloy
   b. pure copper with 0.1% impurities *
   c. very strong alloy
   d. none of the above

260. ETP grade copper alloy, during cold working can withstand reduction upto
   a. 50-60%   b. 60-70%
   c. 85-95% *   d. none of the above

261. Ductility of ETP grade copper alloy highly increases when annealed in the range of
   a. 200-250^0 C   b. 250-300^0 C
   c. 375-650^0 C *   d. 450-650^0 C

262. ETP grade copper alloy is developed by
   a. Bharat Coppers Ltd.
   b. National Metallurgical laboratries
   c. M/S Rastriya Metal Industries Ltd. *
   d. Defence research laboratories

263. Other than copper, in ETP grade copper alloy, other elements added in the weight range from 0.005 to 0.08 are
   a. Sn, Pb, Zn   b. Fe, O, Si
   c. As, Sb, Ni, S   d. all above *

264. ETP grade copper alloy is annealed in temperature range of
   a. 300-500^0 C   b. 400-600^0 C
   c. 375-650^0 C *   d. none of the above

265. The melting range of ETP grade copper alloy is
   a. 900-1100^0 C   b. 1065-1083^0 C *
   c. 1110-1143^0 C   d. 1040-1050^0 C

266. Density of ETP grade copper alloy is
   a. 8 g/cm^3 b. 10 g/cm^3
   c. 8.95 g/cm^3 *   d. none of above

267. ETP grade copper alloy sheets are used for
   a. cover plates in aircraft
   b. perforated plates in aircraft
   c. both above *
   d. none of the above

268. Al-bronze extruded tube grade (1) is containing, alongwith copper
   a. 9-11% aluminium   b. 2-4% Fe
   c. 1-2 % manganese   d. all above *

269. Al. bronze extruded tube grade (1) is developed by
a. Bharat coppers ltd.
b. Rastriya Metal Industries Ltd.
c. M/S Indosive Engineers Pvt. Ltd. *
d. none of the above

270. Al-bronze extruded tube grade (1) is heat treated with
a. heat at 850^0 C/WQ + age at $350\text{-}450^0$ C *
b. heat at 750^0 C/WQ + age at $300\text{-}350^0$ C
c. heat at 650^0 C/WQ + age at $250\text{-}300^0$ C
d. none of the above

271. Al-bronze extruded tube grade (1) is having the melting temperature of
a. $1000\text{-}1050^0$C b. $1025\text{-}1040^0$C *
c. $1100\text{-}1120^0$C d. $1130\text{-}1145^0$C

272. The density of al-bronze extruded tube grade(1) is
a. 8.3 g/cm^3 b. 8.5 g/cm^3
c. 7.5 g/cm^3 * d. none of the above

273. Al-bronze extruded tubes are used to make
a. sealing rings b. washers
c. stack pipes d. all above *

274. Copper tubes grade M-3 is a high purity alloy with 99.5% copper with impurities of
a. Sn, Pb, Fe b. O, Bi, As
c. Ni and S d. all above *

275. Copper tubes grade M-3 is developed by
a. M/S Rastriya Metal Industries Ltd.
b. M/S Indosive Engineers Pvt. Ltd.
c. M/S Alcobex Metals (P) Ltd. *
d. M/S. HAL Koraput Div.

276. Composition of copper tubes grade M-3 is
a. Cu 99.9-Pb 0.02 - others 0.1 *
b. Cu 99 - Pb 0.5 - others 0.5
c. Cu 99.5 - Pb 0.5
d. none of the above

277. Copper tubes grade M-3 is annealed in the range of
a. $350\text{-}400^0$C b. $375\text{-}650^0$C *
c. $410\text{-}680^0$C d. none of the above

278. Density of copper tubes grade M-3 is
a. 7.8 g/cm^3 b. 8.95 g/cm^3 *
c. 9.2 g/cm^3 d. 8.6 g/cm^3

279. Copper tubes grade M-3 is processed by
a. forging b. casting
c. drawing * d. none of the above

280. Copper tubes grade M-3 is used to make
a. washers and sealing rings of engine fuel system
b. stack pipes and seavage which are present in the vicinity of cumbustion chamber
c. above mentioned parts in a. & b. *
d. fuel and oil tubings

281. Tensile strength of copper wire is
a. 30,000 Psi b. 40,000 Psi *
c. 20,000 Psi d. 10,000 Psi

282. A brass composed of copper and zinc in ratio of 6 : 4 is called as
a. naval brass b. muntz brass *
c. red brass d. none

283. Which of the following is high zinc brass ?
a. naval brass b. muntz brass
c. red brass d. manganese brass *

284. Which of the following material is exceptionally strong?
a. naval brass b. muntz brass
c. red brass d. manganese brass *

285. Which of the following brass is extremely hard ?
a. naval brass b. muntz brass
c. red brass d. Hy-Ten-SI-bronze *

286. For bearings or bushings, subjected to heavy loads is used
a. naval brass b. muntz brass
c. red brass d. Hy-Ten-SI-bronze *

287. Which of the following is called tobin bronze ?
a. manganese bronze b. Hy-Ten-SI-bronze
c. naval brass * d. red brass

288. Which of the following are used for manufacturing of parts, that regularly comesd in contact with salt water?
a. muntz metal b. naval brass
c. both a. & b. * d. none

289. Which of the following has good casting and finishing property ?
a. muntz metal b. naval brass
c. red brass * d. Hy-ten-SI-bronze

290. Which of the following is called manganese-alluminium-bronze?
a. naval brass b. manganese bronze *
c. muntz metal d. red brass

291. Which of the following material has excellent machinability?
a. naval brass * b. manganese bronze
c. muntz metal d. red brass

292. Which of the following brass is sometimes classified as bronze because of tin content
a. naval brass b. manganese bronze
c. muntz metal d. red brass *

293. Copper alloy containing tin is called
a. bronze b. steel
c. gun metal * d. both as a. and c.

294. Which of the following is used for manufacturing of fuel and oil line fittings ?
a. red brass * b. muntz metal
c. manganese bronze d. naval brass

295. Which of the following is under brass category but termed under bronze ?
a. manganese bronze b. naval brass
c. red brass d. both a. and c. *

296. Which of the following is a hard bronze casting material
a. gun metal * b. phosphorous bronze
c. aluminium bronze d. none

297. Which of the following is called as leaded gun metal
a. gun metal
b. phosphorous bronze
c. phosphorous bronze casting alloy *
d. none

298. Which of the following has good resistant towards salt-water corrosion ?
a. aluminium bronze
b. gun metal
c. phosphorous bronze
d. phosphorous bronze casting alloy *

299. Which of the following possessgreater resistance to corrosion ?
a. aluminium bronze * b. aluminium brass
c. manganese bronze d. manganese brass

300. Which of the following is used for worm gears ?
a. aluminium bronze *
b. phosphorous bronze casting alloy
c. phosphorous bronze
d. all of the above

301. Which of the following is entirely responsible for season cracking ?
a. internal stresses * b. external stresses
c. both a. & b. d. none

302. Strain test is used for detection of
a. surface property b. tensile strength
c. surface cracking d. seasonal cracking *

303. Which of the following has good bearing qualities ?
a. phosphorous bronze
b. phosphorous bronze casting alloy
c. aluminium *
d. bronze cable

304. Which of the following has good machineability ?
a. phosphorous bronze
b. phosphorous bronze casting alloy *
c. aluminium bronze
d. bronze cable

305. Which of the following undergo seasonal cracking ?
a. bronzes b. brasses
c. none of the above d. both a. & b. *

306. For fluid connecting fittings and coupling sleeves
a. phosphorous bronze is used
b. phosphorous bronze casting alloy is used
c. bronze cable is used
d. aluminium bronze is used*

307. Which of the following is called as leaded phosphorous bronze ?
a. phosphorous bronze
b. phosphorous bronze casting alloy *
c. aluminium bronze
d. bronze cable

308. Which of the following is used for electric contacts and small rings ?
a. phosphorous bronze *
b. phosphorous bronze casting alloy
c. aluminium bronze
d. bronze cable

309. Which of the following bronze are recommended for use under severe working conditions ?
a. gun metal *
b. phosphorous bronze
c. phosphorous bronze casting alloy
d. bronze cables

310. Internal stresses that are developed inside bronze or brass materials are due to
a. heat treatment b. cold working *
c. hot working d. none of above

311. For greater strength as well as greater corrosion resistance, which of following is used ?
a. phosphorous bronze
b. phosphorous bronze casting alloy
c. aluminium alloy *
d. none of the above

312. For good strength and resistant to salt water which of the following are used ?
a. aluminium bronze
b. phosphorous bronze
c. phosphorous bronze casting alloy *
d. gun metal

313. Which of the following has great strength and resistant to corrosion and shock ?
a. aluminium bronze
b. aluminium bronze casting alloy *
c. bronze cable
d. gun metal

314. Seasonal cracking evolves in bronze/brass
a. with suddenly acting load
b. with gradually acting load
c. spontaneously with internal stresses *
d. none

315. For fluid connection fittings, which of the following is widely used ?
   a. aluminium bronze *
   b. aluminium bronze casting alloy
   c. phosphorous bronze casting alloy
   d. phosphorous bronze casting alloy

316. AM - QQ - B - 672 specifies
   a. aluminium bronze
   b. phosphorous bronze
   c. aluminium bronze casting alloy *
   d. phosphorous bronze casting alloy

317. AM - B - 16 specifies
   a. alluminium bronze *
   b. alluminium bronze casting alloy
   c. phosphorous bronze casting alloy
   d. phosphorous bronze

318. Specification AN - QQ - B - 646 is associated with
   a. red brass   b. naval brass *
   c. Hy - Ten - SI bronze   d. all

319. Which of the following is wear resistance and readily machineable ?
   a. Hy - Ten - SI bronze *   b. naval brass
   c. muntz metal   d. none

320. Which of the following is recommended for bearings or by ushings that are subjected to heavy load ?
   a. Hy - Ten - SI bronze *   b. naval brass
   c. munz metal   d. none

■■■

CHAPTER - 36
WROUGHT ALUMINIUM ALLOYS

1. Metallic aluminium is obtained by
   a. electrolytic process *
   b. mechanical process
   c. combination of a. & b.
   d. none

2. In which of the following alloys, physical properties are improved by cold working ?
   a. strained hardened alloys *
   b. heat treatable alloys
   c. strained softened alloy
   d. all

3. The heat treatable alloys can be obtained in
   a. soft annealed condition
   b. heat treated condition
   c. cold worked condition
   d. all *

4. With addition of alloying elements to pure aluminium
   a. it's corrosion resistance increases
   b. it's corrosion resistance decreases *
   c. it's corrosion resistance do not change
   d. any of above

5. Greater strength is obtained is in
   a. heat-treatable alloys *
   b. heat-hardening alloys
   c. strain-hardened alloy
   d. stress-hardened alloy

6. Which of following is most resistant to salt water ?
   a. 52 S * b. 2 S
   c. 3 S d. none

7. Which of the following is least resistant to atmosphere?
   a. 52 S * b. 2 S
   c. 3 S d. none

8. Pitting of surface is analogous to
   a. dusting of iron b. rusting of iron *
   c. decay of iron d. all above

9. Which of the following is serious type of corrosion?
   a. salt water corrosion
   b. atmospheric corrosion
   c. intercrystalline corrosion *
   d. none

10. Which of the following greatly reduces strength as well as ductility ?
    a. salt water corrosion
    b. atmospheric corrosion
    c. intercrystalline corrosion *
    d. none

11. Which of the following alloy is abbreviated as Alclad
    a. 17 S b. 24 S
    c. 18 C d. both a & b *

12. Aluminium coating is put on alloys by
    a. annealing b. forging
    c. casting d. rolling *

13. Aluminium alloy acting as ____________ to it's underlying alloy
    a. electro positive * b. electro negative
    c. magnato positive d. magnato negative

14. The cladding on 14 S and R 301 is a
    a. magnesium silicide of 53 S *
    b. magnesium silicide of 43 S
    c. aluminium silicide of 53 S
    d. aluminium silicide of 43 S

15. As compared to a standard alloy the clad material for same thickness is having
    a. more strength b. less strength *
    c. equal strength d. none

16. Shapes like T-section, Z-section are obtained by
    a. extrusions * b. forgings
    c. heat treatment d. all above

17. In order to provide light, strong fittings of other structural parts which of following processes are preferred ?
    a. extrusion b. forging *
    c. heat treatment d. all of above

18. A blow hole and cavities free uniform structure is obtained by
    a. extrusion b. forging *
    c. heat treatment d. all of above

19. How much draft is maintained in laying out forging ?
    a. 1^0 b. 3^0
    c. 5^0 d. 7^0 *

20. Most easily workable and cheapest aluminium alloy forging is
    a. 17 ST b. 18 ST
    c. A51 ST * d. 75 ST

21. Aluminium propeller blades are manufactured by forging from
    a. 25 ST * b. 35 ST
    c. A51 ST d. none

22. For highly loaded structural part which of following has highest physical property
    a. 32 ST b. 75 ST *
    c. 53 ST d. 18 ST

23. Good mechanical property are found in
    a. 17 ST b. 53 ST
    c. 14 ST * d. 32 ST

24. Which of the following are most satisfactory for spot welding
    a. 51 S b. 52 S *
    c. 53 S d. 54 S

25. Which of the following are used for aircraft structure, because of their good corrosion resistance ?
    a. A51 ST b. 25 ST
    c. 53 ST d. 75 ST *

26. Which of the following aluminium alloys are used for manufacturing of heavily oiled parts
    a. 14 ST b. 17 ST
    c. 75 ST * d. 25 ST

27. _____________ press forgings are ideal for tank flanges welded in place
    a. 53 ST * b. 17 ST
    c. 14 ST d. 25 ST

28. Propellers are usually manufactured from ___________ for satisfactory service
    a. 53 ST b. 17 ST
    c. 25 ST * d. 14 ST

29. Machines used for spot welding at present age have output current, varying between
    a. 30-40 Amp b. 3000-4000 Amp
    c. 300-400 amp d. 30000-40000 Amp *

30. Clad alloys are most satisfactory for
    a. spot welding * b. seam welding
    c. resistance welding d. gas welding

31. Which of the following cannot be spot welded
    a. cathodically treated element
    b. anodically treated element *
    c. neutrally treated element
    d. none of above

32. Aging can be retarded for longer period
    a. if a higher temperature is maintained
    b. if a lower temperature is maintained *
    c. if a constant temperature is maintained
    d. none of above

33. Which of the following needs solution heat treatment to develop their full properties ?
    a. 14 S b. 25 S
    c. 17 S * d. all

34. Which of the following alloys need both solution and precipitation heat treatment
    a. 14 S * b. 17 S
    c. 24 S d. all

35. In which of the following cases ageing material previously subjected to solution heat treatment, by holding it at an elevated temperature for a long period of time ?
    a. solution heat treatment
    b. precipitation heat treatment *
    c. combining a. and b.
    d. none

36. In which of the following process the alloying constituents enter into solid solution in aluminium
    a. solution heat treatment *
    b. precipitation heat treatment
    c. combination of a. & b.
    d. none

37. Eutectic melting takes place at
    a. high temperature
    b. very high temperature *
    c. low temperature
    d. moderate temperature

38. During heat treatment of aluminium alloy the incipient melting of eutectic takes place
    a. above upper limit * b. below upper limit
    c. at upper limit d. none

39. The length of time in heat treatment is dependent upon
    a. nature of material
    b. the previous heat treatment of the material
    c. the thickness of material
    d. all of the above *

40. Heavier material require
    a. longer soaking time *
    b. shorter soaking time
    c. longer breaking time
    d. shorter breaking time

41. Solution heat treatment is usually done by
    a. salt bath * b. acid bath
    c. distilled water bath d. iron bath

42. The salt bath is composed of
    a. fused sodium nitrate
    b. solution of sodium nitrate and potassium nitrate
    c. either a. or b. *
    d. all

43. For salt bath the proportion at which the solution of potassium nitrate and sodium nitrate maintained is
    a. 1 : 2 b. 1 : 3
    c. 1 : 1 * d. 1 : 4

44. Clad material in heat treatment are
    a. heated gradually
    b. heated suddenly *
    c. cooled gradually
    d. cooled suddenly

45. When alloying elements of base material diffuse,
    a. the corrosive resistance is improved
    b. the corrosive resistance destroys *
    c. not affects the corrosive resistance
    d. all of the above

46. Quenching in heat treatment process is accomplished by
    a. high velocity and high volume jet *
    b. high velocity and low volume jet
    c. low velocity and low volume jet
    d. low velocity and high volume jet

47. Quenching results in
    a. adherence of steam pockets *
    b. coherence of steam pockets
    c. either a or b
    d. none

48. Forging and castings are normally quenched by
    a. immersion in water *
    b. immersion in oil
    c. immersion in acid
    d. none

49. In order to remove all salt after salt bath and quenching, it is rinsed by
    a. hot water * b. salt water
    c. acid d. all

50. Use of hot water for removal of salt in rinsing would effect
    a. corrosion resistance
    b. ageing of material
    c. both a. & b. *
    d. strength of material

51. In precipitation heat treatment the temperature range is around
    a. 200^0 F b. 300^0 F *
    c. 400^0 F d. 100^0 F

52. In bolt manufacturing, during heat treatment the bolt held at
    a. vertical position * b. horizontal position
    c. inclined position d. none

53. Heat treatable alloys are annealed
    a. to remove strain hardening effect *
    b. to remove stress hardening effect
    c. to add stress hardening effect
    d. to add strain hardening effect

54. In order to soften heat-treated material which of the following process is used ?
    a. annealing * b. rolling
    c. forging d. casting

55. For annealing of heat treated alloy
    a. high temperature is maintained
    b. very high temperature is maintained *
    c. low temperature is maintained
    d. very low temperature is maintained

56. Heat treatable alloys in the annealed condition yield
    a. poor corrosion resistance *
    b. good corrosion resistance
    c. good strength
    d. none

57. During heat treatment of annealing, the heat treatment effects are destroyed by cooling the material
    a. at higher rate b. at moderate rate
    c. at slower rate * d. at normal rate

58. Clad material are spot welded to
    a. 14 ST b. 24 ST
    c. 75 ST d. all *

59. For spot welding which of the following is most preferable
    a. 51 S b. 53 S *
    c. 52 S d. 25 S

60. For fabrication of primary structural parts of aircraft which of the following is preferred ?
    a. resistance welding b. inductance welding
    c. seam welding d. spot welding *

61. Forgings and castings are normally quenched by immersing into
    a. salt solution b. acid
    c. water * d. oil

62. Rivets are quenched by dumping into
    a. hot water b. cold water *
    c. normal water d. oil

63. After heat treated in salt water the salt are removed by using
    a. warm water * b. cold water
    c. warm oil d. cold oil

64. Maximum temperature that can be maintained for rinsing for removal of salt is
    a. 100^0 F b. 50^0 F
    c. 150^0 F * d. 1200^0 F

65. Heat treatable alloys in the annealed condition has
    a. poor corrosion resistance *
    b. good strength
    c. good corrosion resistance
    d. none

66. Which of the following alloy has maximum density in lb / cu.in ?
a. 2 S b. 3 S *
c. 52 S d. all

67. The maximum electrical conductivity out of the following is
a. 2 S b. 3 S *
c. 52 S d. all

68. In case of strain hardened alloys the maximum strength obtained by
a. heat treatment
b. cold working *
c. combination of a. & b.
d. none of the above

69. Which of the following alloy has greater fatigue & tensile strength ?
a. 3 S 1/2 H b. 52 S 1/2 H
c. 3 S 1/4 H d. 52 S 1/4 H *

70. The cowling crack reduces with
a. higher fatigue strength *
b. lower fatigue strength
c. higher tensile strength
d. higher shear strength

71. Strained hardened alloys are normally joined by
a. electric arc welding b. gas welding
c. resistance welding * d. all

72. Most of the welding on strain hardened aluminium alloy is done in fabrication of
a. airframes b. fuel tanks
c. oil tanks d. both b. & c.

73. Which of the following aluminium alloy are resistant to atmospheric corrosion ?
a. 3 S b. 2 S *
c. 5 S d. none

74. Which of the following aluminium alloy will resist salt water ?
a. 2 S b. 3 S
c. 52 S * d. 56 S

75. Which of the following alloy have practically no corrosive action in magnesium alloy ?
a. 2 S b. 3 S
c. 52 S d. 56 S *

76. Which of the following alloy are used for welded fuel tanks and general engine cowlings ?
a. 3 S 1/2 H * b. 52 SO
c. 52 S 1/2 H d. none

77. Which of the following tubing used for electrical conduit ?
a. 2 S 1/2 H b. 52 SO *
c. 3 SO d. 565 1/4 H

78. Which of the following tubing is used for fuel and oil lines ?
a. 2 S 1/2 H b. 3 So *
c. 52 SO d. 565 1/4 H

79. Which of the following is used for ring cowls and other parts that are formed by spining
a. 2 S 1/2 H b. 3 So
c. 52 So d. 565 1/4 H *

80. Which of the following is used for wing skins
a. clad 24 S - T 86 * b. clad 24 S - T 84
c. clad 24 S - T 80 d. all

81. In case of parts formed from annealed sheet that can not be stretched which of the following are used ?
a. clad 24 S - T 86 b. clad 24 S - T 84
c. clad 24 S - T 80 d. all *

82. Which of the following is used for parts requiring morderate formability ?
a. clad 24 S - T 86 b. clad 24 S - T 84
c. clad 24 S - T 80 d. clad 24 S - T 81 *

83. Which of the following is used for stiffeners and stringers ?
a. clad 24 S - T 81 b. clad 24 S - T 84
c. clad 24 S - T 86 * d. clad 24 S - T 82

84. Which of the following has excellent formability ?
a. 75 ST b. 61 S *
c. 24 S d. none

85. Which of the following has poor formability ?
a. 75 ST * b. 61 S
c. 24 S d. none

86. Which of the following require heat-treatment ?
a. 17 S * b. A 17 ST
c. 53 SO d. 53 SW

87. Where every pound of rivet strength is necessary which of the following rivets are used ?
a. 17 S b. 24 S *
c. both a. & b. d. none

88. Which of the following has better heading qualities?
a. 17 S b. 24 S
c. both a. & b. * d. none

89. Which of the following clad redii are used for fully aged condition ?
a. 24 ST * b. 14 SW
c. 75 SW d. all

90. Which of the following are clad redie for freshly quenched material ?
a. 24 ST b. 14 SW
c. 75 SW * d. all

91. Which of the following has excellent corrosion resistance ?
    a. 53S material b. pure aluminium
    c. both equal * d. none

92. Which of the following has corrosion resistance and great strength ?
    a. 53 S material b. pure aluminium
    c. 61 S material * d. none

93. Which of the following has better corrosion resistance
    a. 14 ST b. R 301-T
    c. 24 ST * d. all

94. Which of the following is much more corrosion resistance ?
    a. 24 ST * b. 17 SO
    c. 24 SO d. all

95. Which of the following are used for primary structures requiring high strength ?
    a. 14 S extrusions * b. 14 S clad
    c. 17 ST d. A 17 ST

96. Which of the following rivets are frequently used to avoid the necessity for heat treatment ?
    a. 14 S b. 14 S clad
    c. 17 ST d. A 17 ST *

97. Which of the following is used for propeller blades and engine parts ?
    a. 32 ST b. 25 ST *
    c. 18 ST d. none

98. Which of the following is used for aircraft engine pistons ?
    a. 25 ST b. 32 ST *
    c. 18 ST d. all

99. Which of the following is used for complicated engine parts ?
    a. 25 ST b. 32 ST *
    c. A 51 ST d. none

100. For use where the corrosion resistance is of primary importance. The alloy preffered is
    a. 25 ST b. A 51 ST
    c. 53 S * d. 61 S

101. Which of the following has excellent forming characteristics ?
    a. A 51 ST b. 53 S *
    c. 61 S d. A 51 ST

102. Which of the following are the strongest aluminium alloy ?
    a. 51 SW b. R 303 *
    c. R 301 d. none

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CHAPTER - 37
ALUMINIUM - ALLOY CASTINGS

1. As a general rule casting have ____________ % margin of strength when used in aircraft
   a. 50 b. 60
   c. 80 d. 100 *

2. For limited production
   a. casting is expensive b. forging is expensive
   c. casting is cheaper * d. forging is cheaper.

3. Which of the following is on way of casting ?
   a. sand casting b. permanent mold
   d. die casting d. all above *

4. When many small parts must be made and held to close tolerance, which of following is preferred ?
   a. sand casting
   b. permanent mold casting
   c. die casting *
   d. all.

5. For manufacturing complicated shape the which of following casting is preferred ?
   a. sand casting *
   b. permanent mold casting
   c. die casting
   d. all.

6. Which of the following casting is preferred for higher accuracy ?
   a. sand casting
   b. permanent mold casting *
   c. die casting
   d. all .

7. The shrinkage allowance for aluminium alloy in sand casting is
   a. 5/16 inch/ft. b. 5/32 inch/ft. *
   c. 5/64 inch/ft. d. 5/8 inch/ft.

8. For desired machine finish in sand casting the machining allowance is
   a. 5/16 b. 1/16 *
   c. 21/16 d. 32/16

9. Aluminium-alloy sand casting can not be manufactured with in wall thickness of
   a. 1/8 inch b. >1/8 inch
   c. <1/8 inch * d. none

10. The size and complexity of casting is not a limiting factor in
    a. sand casting * b. die casting
    c. permanent mold casting
    d. all.

11. Which of the following alloy have maximum percentage of elongation ?
    a. 212 b. 214
    c. 220 - T4 * d. 355 - T6.

12. Which of the following alloy of aluminium have minimum percentage of elongation ?
    a. 212 * b. 214
    c. 220-T4 d. 355-T6

13. Which of the following aluminium alloy have minimum Brinell hardness ?
    a. 212 b. 214
    c. 43 * d. 195 - T4.

14. Which of the following aluminium alloy have maximum Brinell hardness ?
    a. 212 b. 355 - 76 *
    c. 195 - T4 d. 356 - T4.

15. Which of the following aluminium alloy have minimum density in cu in ?
    a. 220-T4 * b. 43
    c. 355 - T6 d. 356 - T4.

16. Which of the following aluminium alloy have maximum density ?
    a. 195 - T4 b. 196 - T6
    c. 212 * d. 214.

17. For complicated and thin wall casting, the aluminium alloy used is
    a. 195 - T4 b. 196 - T6
    c. 43 * d. 214.

18. Which of the following remains fluid down amongst to the solidification point ?
    a. 195 - T4 b. 196 - T6
    c. 43 * d. 214.

19. Which of the following provides a dense, leak proof casting ?
    a. 195- T4 b. 43 *
    c. 196 - T6 d. 214

20. The alloy 43
    a. makes a dense casting
    b. is leakproof casting
    c. has high corrosion resistance
    d. all of the above. *

21. Which of the following aluminium alloy is used for structural aircraft casting ?
    a. 195 - T4 * b. 43
    c. 196 - T6 d. 214.

22. 196 - T6 as compared to 195 - T4
    a. has less elongation
    b. has less shock resistance
    c. is stronger
    d. all of above *

23. If high strength is not necessary for general purpose, the aluminium alloy used is
    a. 194 - T4 b. 43
    c. 195 - T6 d. 212 *

24. Which of the following has maximum corrosion resistance ?
    a. 195 - T6 b. 195 - T4
    c. 214 * d. 212.

25. 220 - T4 has
    a. high tensile strength
    b. high yield strength
    c. both a. and b. *
    d. high corrosion resistance.

26. At least 1/4 inch thickness is desirable, because of, high solidification shrinkage in
    a. 220 T4 * b. 355 - T6
    c. 256 - T4 d. 212.

27. Which of the aluminium alloy has excellent casting qualities ?
    a. 220 T4 b. 355 - T6 *
    c. 356 - T4 d. all.

28. For complicated casting, 195 - T4 is replaced by
    a. 220 T4 b. 355 - T6
    c. 356 - T4 * d. all.

29. High solidification shrinkage is marked in aluminium alloy
    a. 220 T4 * b. 255 - T6
    c. 356 - T4 d. all.

30. Which of the following aluminium alloy has good corrosion resistance ?
    a. 194 - T5 b. 356 - T4
    c. 220 T4 d. both a. & b. *

31. Metal mold is used in
    a. sand casting
    b. permanent mold casting *
    c. die casting
    d. all.

32. When large no. of casting are used, which of the following are used ?
    a. sand casting
    b. permanent mold casting *
    c. die casting
    d. none.

33. Which of the following includes semipermanent mold casting
    a. sand casting
    b. permanent mold casting *
    c. die casting
    d. none

34. When cores are fabricated of sand in the metal mold, it is called as ?
    a. sand casting
    b. semi permanent mold casting *
    c. permanent mold casting
    d. die casting.

35. In which of the following casting, metal is fed into the mold by gravity ?
    a. sand casting
    b. semi permanent mold casting
    c. permanent mold casting *
    d. die casting

36. Chilling in mold casting results in
    a. rapid solidification
    b. a finer grain
    c. both a. & b. *
    d. none.

37. The finer grain results in
    a. more susceptible to heat treatment
    b. improve their corrosion resistance
    c. improves physical property
    d. all of above *

38. Permanent mold aluminium alloy produces a thick ness of about
    a. 1/32 in. b. 2/32 in.
    c. 3/32 in. * d. 4/32. in.

39. Overall dimensional tolerance permanent mold casting is
    a. 0.01 inch * b. 0.02 inch
    c. 0.03 inch d. 0.04 inch.

40. Under permanent mold casting maximum elongation of aluminium alloy is
    a. 43 b. B195 - T4
    c. 356 - T4 d. both (a) and (b). *

41. Maximum Brinell hardness possible among alloys are
    a. 122 - T65 * b. A132 - T4
    c. B195 - T4 d. A214.

42. For better finish and closer dimensional tolerance which of following mold casting aluminium alloy used
    a. 122 b. A 132
    c. 142 d. 43 *

43. Which of following aluminium alloys are used for engine pistons
    a. 122 b. A132
    c. 142 d. All of the above *

44. Which of the following sand casting is used for cylinder heads of aircraft engines
a. 122 b. A132
c. 142 * d. all

45. alloy A214 has the same non tarnishing property as the sand casting alloy
a. 122 b. 214 *
c. 142 d. all.

46. As compared to sand casting alloys permanent mold alloys have
a. slightly higher strength *
b. very high strength
c. very low strength
d. slightly lower strength.

47. Homogeneous and fine grained casting is obtained in
a. sand casting
b. permanent mold casting
c. die casting *
d. semi permanent mold casting.

48. Thickness of finally finished product that is preferred in die casting is
a. 1/16 inch * b. 3/16 inch
c. 5/16 inch d. none.

49. Maximum elongation in die casting is that of
a. 13 * b. 85
c. 218 d. 214.

50. Minimum elongation in die casting is that of
a. 13 b. 85
c. 218 * d. 214.

51. Maximum yield strength among the die casting aluminium alloy is
a. 13 b. 85
c. 218 * d. 214.

52. Minium yield strength among the die casting of aluminium alloy
a. 13 * b. 85
c. 218 d. 214.

53. Which of the following die casting aluminium alloy have good corrosion resistance ?
a. 13 * b. 85
c. 218 d. 214.

54. Which of the following die casting aluminium alloy have excellent casting property ?
a. 13 * b. 85
c. 218 d. 214.

55. Which of the following exhibit excellent combination of strength & ductility.
a. 13 b. 85
c. 214 d. 218 *

56. Which of the following die casting aluminium alloy is difficult to cast in complicated shape ?
a. 13 b. 85
c. 214 d. 218 *

57. Which of the following is a fault in design of all castings
a. high stress concentration should be avoided
b. slender cantilever lugs in section should be avoided
c. Eccentricities should be present *
d. Allow a reasonable margin between the design stress and the elastic limit of the casting.

58. Casting must not be used for
a. Main structural fittings
b. casting taking high bending stresses
c. lugs which may be subjected to accidental bending stresses
d. all of the above *

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CHAPTER - 38
ALUMINIUM WROUGHT AND CAST ALLOYS

1. For aircraft construction, the dominent material is
   a. iron b. aluminium *
   c. copper d. brass

2. The 'Y' alloy constituents
   a. all, Cu, Ni & Mg *
   b. all, Si, Fe, Mag
   c. all, Cr, Co, Zinc
   d. none of the above

3. A material found to posses better over all strength/ fatigue charactoristics over a wide range of temperature
   a. pure aluminium b. magnesium
   c. copper d. hinduminium *

4. The application of aluminium alloy is limited to the temperature in a/c structure
   a. 400^0 C b. 300^0 C *
   c. 600^0 C d. none of the above

5. The ore for aluminium is
   a. hammeatite b. bauxite *
   c. both above d. none of the above

6. To produce the aluminium the electricity is supplied to the bouxite bath with electrolytic salts to
   a. carbon anode b. carbon cathod *
   c. aluminium anode d. none of the above

7. For specialised application the purity of the aluminium can be achieved upto
   a. 85% b. 90%
   c. 99.99% * d. 100%

8. Aluminium has an atomic number
   a. 9 b. 11
   c. 13 * d. 15

9. The valancy of aluminium in chemical compound is
   a. 3 * b. 5
   c. 7 d. 9

10. Hydrogen is appriciably soluble in
    a. solid aluminium
    b. molten aluminium
    c. both above *
    d. none of the above

11. The strength of aluminium is increased by
    a. age hardening
    b. work hardening *
    c. heat treatment
    d. none of the above

12. The aluminium strength can be increased by
    a. work hardening
    b. precipitation hardening
    c. both above *
    d. age hardening

13. In a four digit numerical designation system of Al if Mg is added then the code will be
    a. 1XXX b. 2XXX *
    c. 5XXX d. none of the above

14. If basic temper designation of aluminium W is indicated it means
    a. strain hardened b. solution heat treated *
    c. both above d. none of the above

15. The metal which has the greatest solid solubility in Al is
    a. Zn * b. Cu
    c. Si d. Tin

16. The heat treatable Al alloy of 2XXX code designation can be used for the temperature upto
    a. 200^0 C b. 150^0 C *
    c. 100^0 C d. none of the above

17. The highly effective means of increasing the strength of non-heat treatable Al alloys by strain hardening, by
    a. cold rolling b. stretcthing
    c. drawing d. all of the above *

18. The precipitation strengthening of Al alloys is obtained by
    a. heating at high temperature
    b. As a_1 rapid quenching to a low temperature
    c. both above *
    d. none of the above

19. Artificial ageing can be obtained by
    a. heating at high temperature (in begining)
    b. further heating at intermediate temperature
    c. further heating at high temperature
    d. all above in sequence *

20. The Understanding of Al alloys micro structure can be obtained with the aid of
    a. electron microscopy
    b. SEM & TEM photomicrography
    c. both above *
    d. none of the above

21. To make a relatively a higher Al alloy then the Al itself the alloying elements added are
a. Mg , Cr , Cu
b. Mg , Lithium , silicon *
c. Mg , Silicon , Cu
d. Ni , Mn , Ti

22. If metallic addition are made in aluminium its electric conductivity
a. increases marginally b. decreases *
c. is not affected d. increases tremedously

23. The young's modulus of elasticity is increased to highest by adding
a. lithium b. silicon
c. manganese * d. nickel

24. Pure unalloyed aluminium is __________ for machining.
a. good b. poor *
c. normal d. finest

25. The tensile strength of annealed super-purity aluminium is
a. 30 Mpa b. 45 Mpa *
c. 10 Mpa d. 15 Mpa

26. The yield strength of annealed super purity aluminium is
a. 15 Mpa b. 45 Mpa
c. 10 Mpa * d. 30 Mpa

27. The elongation of annealed super purity aluminium is
a. 30% b. 20%
c. 50% * d. 10%

28. Duralumin is the alloy of
a. Al & Cu * b. Al - mg - Si
c. Al - Zn - Mg d. none of the above

29. Duplex ageing can be accomplished by
a. first heating at ageing temperature for specified time
b. as in a and then ageing at higher temperature *
c. heating to ageing temperature twice by quanching once
d. none of the above

30. For low pressure die casting of aluminium alloy, the molten metal is injected in cast at pressure
a. $<$ 100 KPa b. $>$ 180 KPa
c. $\leq$ 170 KPa * d. 50-75 KPa

31. Usually the deeply finned cylinder heads are casted by
a. die casting b. low pressure casting
c. suction casting * d. sand casting

32. Most-important factor for all aluminium casting process is
a. feasibility b. cost factors
c. quality d. all above *

33. Homogenisation is a high temperature treatment of super cooled aluminium castings
a. to eliminate solute concentration
b. for thermodynamic equilibrium
c. to relieve internal casting stresses
d. for all above *

34. Mark the correct statement
a. aluminium foils are made of pure aluminium with 1% manganese
b. thickness of aluminium foil should not be greater than 0.2 mm
c. both above are correct *
d. none of the above is correct

35. To draw the wire of aluminium usually the rod is of diameter
a. 4-6 mm b. 8-12 mm *
c. 10-12 mm d. 5-7 mm

36. Recommended forging temperature ranges for aluminium alloys are
a. 315 - 455^0 C * b. 250 - 600^0 C
c. 175 - 350^0 C d. 300 - 500^0 C

37. The lithium containing alluminium alloys have density ___________ then aluminium
a. lesser * b. higher
c. double d. one fourth

38. Al - li alloys are replacing with conventional Al alloys for higher
a. strength/weight b. stiffness/weight
c. both above * d. none of the above

39. Indigenised Al alloy 5052 (bars) are:
a. non heat treatable
b. strain hardened type
c. heat treatable
d. a. & b. are correct *

40. The indegenised Al alloy AG5 MC (sheet), have melting range of
a. 570-638^0 C * b. 545-620^0 C
c. 438-573^0 C d. none of the above

41. The indigenised al alloy AK-6 (stampings) have ultimate tensile strength range as
a. 200-300 MPa b. 285-383 MPa *
c. 183-282 MPa d. none of the above

42. The indigenised aluminium alloy AL-5 (casting) is
a. hardened at 525 ± 5^0 C / 4-7 hours
b. ageing at 230 ± 10^0 C / 3-6 hours
c. hardening & ageing at 450 ±5^0 C / 8 hours
d. treated as per a. & b. *

43. Indigenised al alloy AL-9 (casting) have melting range of
a. 555 - 615^0 C * b. 500 - 600^0 C
c. 450 - 550^0 C d. 444 - 515^0 C

44. Indigenised al alloy AU4 G1 (forging stock) have melting range of
    a. 450 - 560^0 C b. 502 - 638^0 C *
    c. 482 - 600^0 C d. none of the above

45. Indigenised al alloy B515 (sheets) is developed by
    a. HAL ltd. b. Indian Al Co ltd.
    c. both above * d. none of the above

46. Indian al alloy HE-15A (forging stock) is developed by
    a. Ordinance factory
    b. Aeronautical Development Agency
    c. HAL koraput
    d. both as a. & b. *

47. Wrought al alloy that do not respond to heat treatment are those which contains
    a. Fe & Mg b. Man & Si
    c. Mn & Mg * d. none of the above

48. Wrought heat treatable alloy are as follows
    a. 3XXX, 5XXX, 1XXX
    b. 2XXX, 3XXX, 9XXX
    c. 2XXX, 6XXX, 7XXX *
    d. 3XXX, 5XXX, 7XXX

49. Duralumin is ___________ alloy
    a. 5XXX b. 2XXX *
    c. 4XXX d. 6XXX

50. Aluminium alloys for casting must have
    a. low melting temperature
    b. good fluidity with rapid heat transfer
    c. both above *
    d. none of the above

51. Al. Cu. alloy usually used for making pistons for IC engines contains copper approximately
    a. ≈ 10% * b. ≈ 15%
    c. ≈ 5% d. ≈ 20%

52. Aluminium alloys which have superior casting characteristics contains major alloying gradient
    a. silicon * b. manganese
    c. magnesium d. zinc

53. Al. Mg. alloys are essentially is
    a. single-phase binary alloy
    b. with better strength and toughness properties
    c. corrosion resistant
    d. all above *

54. Al-Zn-Mg achieves full strength by
    a. ageing * b. heat treatment
    c. working d. none of the above

55. By replacing conventional al alloy with al lithium alloy in aerospace applications the weight reduction is obtained by
    a. 40% b. 30%
    c. 20% d. 10% *

56. The super plasticity is the abililty of certain materials to undergo abnormally large extensions commonly
    a. 100% b. 2000%
    c. 1000% * d. 3000%

57. Aluminium
    a. is 60% lighter than steel
    b. has superior strength to weight ratio
    c. has higher energy impact properties
    d. posses all above qualities *

58. High strength precipitation hardened alloys are produced
    a. from gas-atomised powders
    b. with vaccum hot de-gassed powders
    c. as above in sequence *
    d. not as above

59. In high modulus, low density aluminium lithium alloys, if beryllium is added substantially the weight saving will be in the range of
    a. 5-10% b. 15-25% *
    c. 30-50% d. nil

60. Some al alloys compete with titanium alloys on a specific strength basis over the temperature range of 232 to 243^0 C by adding of transition metals principally the
    a. Fe * b. Ni
    c. Zn d. Ti

61. Vapour quenching method to produce al alloy by electron beam melting is used usually to produce
    a. Al - li alloys b. Al - Cr - Fe alloys *
    c. Al - li - Cr alloys d. none of the above

62. Mechanical alloying of al alloys are produced by
    a. introducing oxides and carbides in a metallic matrix*
    b. melting with electron beam
    c. rapid solidification
    d. none of the above

63. Major application of sp al alloys are in
    a. transport industry b. buildings
    c. aerospace industry * d. all above

■■■

CHAPTER - 39
INDEGENISED ALUMINIUM ALLOYS

1. Al alloy 5052 (bars) are
   a. heat treatable b. non heat treatable
   c. strain hardening type d. as b. & c. *

2. Al alloy 5052 (bars) are developed by
   a. M/S HAL Koraput
   b. M/S Hindustan Aluminium Co. Ltd. *
   c. DRDO
   d. all above

3. The application of 5052 (bars) al alloy is for
   a. air fuel/oil lines & fuel tanks
   b. marines and transport application
   c. sheet metal works, appliances and rivets etc.
   d. all above *

4. Al alloy AG5 MC (sheets) are
   a. non heat treatable wrought alloy
   b. good corrosion resistant
   c. have excellant welding qualities
   d. all above *

5. Application of al alloy AG5 MC (sheets) in aviation industry is to produce
   a. air intake ducts
   b. 1st & 2nd stage diffuser assy
   c. both above *
   d. none of the above

6. Application of al alloy AK-6 (stampings) is from the group of
   a. Al - Fe - Cr - Mn - Mg
   b. Al - Cu - Mg - Mn - Si *
   c. Al - Si - Ti - Fe
   d. Al - Ti - Zn - Cu - Mg

7. Al alloy AK-6 (stampings) is developed by
   a. DRDO
   b. M/S HAL Koraput Div. *
   c. M/S Hindustan Aluminium Co. Ltd.
   d. M/S HAL Lakhnow Div.

8. The application of aluminium alloy AK-6 in aviation industry is to produce
   a. pistons b. crank cases
   c. rings, discs covers d. all above *

9. Al alloy AL-5 (castings)
   a. is heat treatable alloy
   b. contains high silicon contents with magnesium
   c. is not heat treatable
   d. is as a. & b. *

10. Al alloy AL-5 has melting range of
    a. 350-450^{0}C b. 545-620^{0}C *
    c. 450-500^{0}C d. 500-545^{0}C

11. Application of al alloy AL-5 in aviation industry is to produce
    a. super charger covers, fuel pump bodies
    b. air compressor pistons, engine crank cases
    c. liquid cooled cylinder heads
    d. all above *

12. Al alloy AL-9 (castings) are developed by
    a. Hindustan Aluminium Co. Ltd.
    b. M/S Hindustan Aeronautics Ltd. (KD) *
    c. DRDO
    d. all above

13. Al alloy AL-9 is used to make
    a. components of MIG-21 engines
    b. aircraft structures and control parts
    c. nuclear energy installations
    d. all above *

14. Al alloy AL-19 belongs to
    a. al-Cu alloy * b. al-Mag alloy
    c. al-Si alloy d. al-li alloy

15. Al alloy AL-19 is having the Russian equivalent as
    a. gost 2685-75 b. AMTY 380-57
    c. both above * d. none of the above

16. Al alloy AL-19 is used to make aircraft parts, casting working between temperature range of
    a. 100-300^{0}C b. 260-430^{0}C
    c. 175-500^{0}C * d. 350-630^{0}C

17. Al alloy AU 2 GN (extruded bars forging stock) is developed by
    a. M/S HAL Keraput Division
    b. M/S Hindustan Aluminium Co. Ltd.
    c. M/S Indian Aluminium Co. Ltd. *
    d. DRDO

18. Application of AU 2 GN al alloy is for
    a. die and hand forging b. pistons
    c. rotating engine parts d. all above *

19. The melting range of al alloy AU 4 GI (bars & ext. stock) is
    a. 400-550^{0}C b. 502-638^{0}C *
    c. 450-600^{0}C d. none

20. Al alloy AU 4 GI is developed by
    a. M/S Indian Aluminium Co. Ltd.
    b. M/S HAL Bangalore
    c. both above *
    d. none of the above

21. Al alloy B 51S (sheet) is near equivalent to
    a. BS L-113 sheets & strips british
    b. BS 1470 sheets & strips british
    c. 3 2315 DIN 1745 sheets & strips German
    d. all above *

22. Melting range of al alloy B 51S is
    a. 450-600^{0}C b. 566-649^{0}C *
    c. 459-549^{0}C d. 510-680^{0}C

23. Al alloy HE 15A (extruded bars and forging stock) is developed by
    a. M/S HAL Koraput Div.
    b. M/S Ordanance Factory Nagpur
    c. M/S Aeronautical Development Agency
    d. both as b. & c. *

24. Al alloy HE 15A is
    a. Al - Cu - Mg - Si alloy
    b. moderatly high strength and heat treatable
    c. low strength, work hardens
    d. as per a. & b. *

25. Al alloy HE-15A has the melting range of
    a. 450-500^{0}C b. 482-532^{0}C
    c. 507-638^{0}C * d. 550-614^{0}C

26. Al alloy HE-15A is used to make
    a. heavy duty forging
    b. space booster tankage
    c. truck frames and suspension components
    d. all above *

27. Al alloy HE 15A-ST is developed by
    a. HAL Bangalore
    b. Aeronautical Developing Agency
    c. Ordanance Factory Nagpur *
    d. HAL Koraput Div.

28. The melting range of HE 15A-ST al alloy is
    a. 500 ± 10^0C b. 600 ± 10^0C
    c. 700 ± 10^0C * d. 800 ± 10^0C

29. The al alloy HE 15A-ST is usually used to make
    a. airframe top longerons
    b. trailing edge blocks
    c. bracketery items
    d. all above *

30. Al alloy Indal-B 26 Sw
    a. is weldable by gas welding
    b. can be brazed and soldered
    c. its service temperature is above 100^0 C
    d. posses none of the above qualities *

31. Indal -B 26 Sw is developed by
    a. HAL Koraput Div.
    b. HAL Bangalore Div.
    c. Ordanance Factory Nagpur
    d. M/S Indian Aluminium Co. Ltd. Calcutta *

32. Melting range of Indal-B 26 Sw al alloy is
    a. 350-450^{0}C * b. 500-550^{0}C
    c. 513-640^{0}C d. none of the above

33. The al alloy is used in
    a. limited application
    b. mainly for rivets
    c. general engineering purposes
    d. all above applications *

34. Indal-1 S (sheets) posses the qualities of
    a. satisfactory welding by fusion and resistance
    b. high strength with good forming characteristics
    c. excellant corrosion resistance
    d. all above *

35. Indal IS al alloy is used for
    a. heavy duty forgings
    b. plates & extrusion for fittings
    c. truck frames & suspension components
    d. all above *

36. Indal -M 57 S is 5XXX series al alloy with major alloying element
    a. silicon with manganese
    b. magnesium with zinc
    c. magnesium with manganese *
    d. copper with chromium

37. Melting range of M 57 S al alloy is
    a. 407-549^{0}C b. 507-649^{0}C
    c. 607-649^{0}C * d. none of the above

38. Al alloy M 57 S is used to make
    a. aircraft fuel and oil lines
    b. fuel tanks
    c. miscelleneous marine and transport application
    d. all above *

39. Indal 2 S al alloy is a purity alloy with 99% aluminium is used for
    a. making thermo-electrical conductivity part
    b. protective cables for electrical conductors
    c. packaging foils
    d. all above *

40. Indal 3 S al alloy is
    a. a non heat treatable b. weldable
    c. corrosion resistant d. as all above *

41. Indal 3 S al alloy is used to make component which needs
    a. to be welded b. corrosion resistance
    c. better strength d. all above *

42. Indal 24 Sw al alloy is developed by
 a. Hindustan Aluminium Co. Ltd.
 b. Aeronautical Development Agency
 c. HAL Bangalore
 d. Indian Aluminium Co. Ltd., Alwaye, Kerala *

43. Indal 24 Sw al alloy is used for
 a. aircraft structures b. rivets and hardware
 c. truck wheel etc. d. all above *

44. L - 77 al alloy
 a. is heat treatable wrought alloy
 b. contains primary alloying element as Cu and Si
 c. exibit high strength and weldable
 d. as above *

45. L - 77 is used for
 a. heavy duty forging
 b. wheels and major structural components
 c. space booster tankages
 d. all above *

46. V - 65 (rivet wires) al alloy is developed by
 a. Indian Ordanance Factory, Ambarnath
 b. M/S HAL Nasik Division
 c. Hindustan Aluminium Co. Ltd.
 d. both as a. & b. *

47. V - 65 al alloy is used for rivets working at
 a. temperature upto 100^0 C *
 b. temperature upto 150^0 C
 c. temperature upto 200^0 C
 d. temperature upto 250^0 C

48. 650 32A (plates) al alloy is an alloy of
 a. Al - Mg - Si - Cu with Mn or Cr *
 b. Al - li - Cr - Zn with Mn or Cr
 c. Al - Mg - Mn - Fe with Si or Cr
 d. Al - Cu - Cr - li with Mg and Mn

49. 650 32A al alloy is near equivalent to
 a. 6061 QQ - A - 327 plates, American
 b. AMS 4021 - 4027 plates, American
 c. both above *
 d. none of the above

50. 650 32A al alloy is developed by
 a. DRDO
 b. HAL Koraput Div.
 c. Hindustan aluminium Co. Ltd.
 d. Bharat Aluminium Co. Ltd. *

51. 620 32A al alloy has the melting range of
 a. 450-550^0 C b. 550-650^0 C
 c. 582-652^0 C * d. 682-752^0 C

52. For 620 32A al alloy the minimum rolling temperature is
 a. 200-300^0 C b. 250-300^0 C
 c. 280-300^0 C * d. 300-320^0 C

53. 650 32A (plates) al alloy is used to make
 a. fuel tanks for 'PRITHVI' missiles
 b. anything where strength, weldability and corrosion resistance is required
 c. both above *
 d. none of the above

54. AU 4 GI (extruded sections) al alloy contains
 a. Cu - Mg - Mn * b. Mg - Si - Mn
 c. Cu - Si - Cr d. Mg - Zn - Ti

55. AU 4 GI is developed by
 a. M/S Indian Aluminium Co. Ltd.
 b. M/S HAL Bangalore
 c. both above *
 d. Bharat Aluminium Co. Ltd.

56. AU 4 GI al alloy is extruded
 a. at 450^0 C
 b. with 9000 T hydraulic press
 c. both above are correct *
 d. both above are wrong

57. AU 4 GI al alloy has melting temperature of
 a. 400-450^0 C b. 450-500^0 C
 c. 502-638^0 C * d. 572-648^0 C

58. AU 4 GGI al alloy is used for
 a. rotors of chetak/cheetah helicopters
 b. aircraft structure
 c. rivets and hardwares
 d. all above *

59. DTD - 5124 (extruded sections) al alloy is
 a. heat treatable
 b. can be resistance welded but not fusion
 c. alloy of Zn and Mg as major elements
 d. as above *

60. Al alloy DTD - 5124 is developed by
 a. DRDO
 b. HAL Koraput Div.
 c. HAL Bangalore Div.
 d. M/S Indian Aluminium Co. Ltd. *

61. DTD - 5124 al alloy is extruded
 a. at 450^0 C
 b. with 1250 T hydraulic press
 c. as both above *
 d. not as above

62. Melting range of DTD - 5124 al alloy is
 a. 350-400^0 C b. 400-450^0 C
 c. 477-635^0 C * d. 437-587^0 C

63. DTD 5124 al alloy is used to make
 a. wing root fittings of KIRAN aircraft
 b. highly stressed structural parts
 c. both above *
 d. lightly stressed structural parts

64. L 83 (extruded bars forging stock) is
    a. heat treatable aluminium alloy
    b. weldable only with special technique
    c. machinable
    d. as above *

65. L - 83 al alloy is developed by
    a. HAL Koraput Div.
    b. HAL Bangalore Div.
    c. Bharat Aluminium Co. Ltd.
    d. Indian Aluminium Co. Ltd. *

66. L - 83 al alloys are used to manufacture
    a. pistons b. rotating engine parts
    c. both above * d. none of the above

67. HE - 20 A (extruded bars) al alloy is of
    a. intermediate strength
    b. excellant corrosion resistant
    c. weldable type
    d. as above *

68. HE - 20 A al alloy is used to make
    a. secondary structural components
    b. airframe bracketary of LCA aircraft
    c. trucks. towers, rail-road cars & pipe lines
    d. all above *

69. 1441 & 1441 M (sheets) al alloy is
    a. Al - li alloy * b. Al - Mg alloy
    c. Al - Si alloy d. Al - Ni alloy

70. 1441 - 1441 M al alloy is developed by
    a. M/S Defence Metallurgical Research Laboratory
    b. M/S All-Russian Institute of Aviation Material
    c. both above *
    d. Indian Aluminium Co. Ltd.

71. Melting range of 1441 - 1441 M al alloy is
    a. 500-600^0 C b. 560-670^0 C *
    c. 600-650^0 C d. 450-560^0 C

72. 1441 - 1441 M al alloy is used
    a. at intended application in LCA programme
    b. in soviet MIG - 33 aircraft
    c. as both above *
    d. none of the above

73. 1441 - 1441 M al alloy posses
    a. damage tolerance
    b. medium strength
    c. density 2.58 g/am^3
    d. all above *

74. 8090 (sheets) al alloy posses
    a. damage tolerant medium strength
    b. lower density
    c. higher elastic modulus
    d. all above *

75. 8010 al alloy is heat treated
    a. by solutionising : 535^0 C/WQ *
    b. by furnace heating : 535^0 C/WQ
    c. by both above method
    d. by none of the above method

76. Melting range of 8090 al alloy is
    a. 550-640^0 C b. 600-655^0 C *
    c. 510-590^0 C d. none of the above

77. 8090 (sheets) al alloy have co-efficient of thermal expansion (linear)
    a. from 20-100^0 C : 21.4 μm/m^0 C *
    b. from 20-100^0 C : 15.4 μm/m^0 C
    c. from 20-100^0 C : 25.1 μm/m^0 C
    d. none of the above

78. 8090 al alloy have the density as
    a. 2.55 g/cm^3 * b. 3.1 g/cm^3
    c. 1.75 g/cm^3 d. 2.8 g/cm^3

79. 8090 (sheets) al alloy is used
    a. on Mac-Don Douglas F-15 SMTD technology
    b. on British Aerospace EAP technology demonstrator
    c. on Titan IV pay load adoptor by lockheed
    d. by all above *

80. 8090 (sheets) al alloy is developed by
    a. M/S HAL Koraput Div.
    b. M/S Bharat Aluminium Co. Ltd.
    c. M/S Defence Metallurgical Laboratories *
    d. M/S Hindustan Aluminium Co. Ltd.

81. 8090 (sheets) al alloy have typical modulus of elasticity with temper 'T6' is
    a. 70.3 b. 79.5 *
    c. 72.6 d. 82.3

WROUGHT ALUMINIUM ALLOYS

82. Forging and casting are normally quenched by immersing in to
    a. Salt solution b. Acid
    c. Water * d. Oil.

83. Rivets are quenched by dumping into
    a. Hot water b. Cold water *
    c. Normal water d. Oil.

84. After heat treated in salt water the salt are removed by using
    a. Warm water * b. Cold water
    c. Warm oil d. Cold oil.

85. Maximum temperature that can be maintained for rinsing for removal of salt is
    a. 100°F b. 50°F
    c. 150°F * d. 200°F.

86. Heat treatable alloys in the annealed condition has
    a. Poor corrosion resistance *
    b. Good strength
    c. Good corrosion resistance
    d. None.

87. Which of the following alloy has maximum electrical conductivity of following is
    a. 2S. b. 3S *
    c. 52S d. all.

88. The minimum electrical conductivity of following is
    a. 2S * b. 3S
    c. 52S d. all.

89. In case of strain hardened alloys the maximum strength obtainable by
    a. Heat treatment
    b. Cold working *
    c. Combination of a. & b.
    c. None.

90. Which of the following alloy has greater fatigue & tensile strength
    a. 3S ½H b. 52S ½H
    c. 3S¼H d. 52S ¼ H. *

91. The cowling crack reduces with
    a. higher fatigue strength *
    b. lower fatigue strength
    c. higher tensile strength
    d. higher shear strength.

92. Strain hardened alloys are normally joined by
    a. electric arc welding b. resistance welding *
    c. gas welding d. all.

93. Most of the welding on strain hardened aluminium alloy is done in fabrication of
    a. airframes b. fuel tanks
    c. oil tanks d. both (b) & (c). *

94. Which of the following aluminium alloy are resistant to atmospheric corrosion
    a. 3S b. 2S *
    c. 5S d. None.

95. Which of the following aluminium alloy will resist salt water
    a. 2S b. 3S
    c. 52S * d. 56S.

96. Which of the following alloy have practically no corrosive action in magnesium alloy
    a. 2S b. 3S
    c. 52S d. 56S *

97. Which of the following alloy is used for welded fuel tanks and general engine cowlings
    a. 3S½H * b. 52SO
    c. 52S½H d. none

98. Which of the following tubing used for electrical conduit
    a. 2S½H * b. 52SO
    c. 3SO d. 56S¼H.

99. Which of the following tubing is used for fuel and oil lines
    a. 2S ½H b. 3SO
    c. 52SO * d. 56S¼H.

100. Which of the following is used for ring cowls and other parts that are formed by spining
    a. 2S ½H b. 3SO
    c. 52SO d. 56S¼H *

101. Which of the following used for wing skins
    a. clad 24S-T86 * b. clad 24S-T84
    c. clad 24S-T80 d. all.

102. In case of parts formed from annealed sheet that can not be stretched, which of following is used
    a. clud 24S-T86 b. clud 24S-T84
    c. clud 24S-T80 d. all.

103. Which of the following is used for parts requiring morderate formability
    a. clad 24S-T86 b. clad 24S-T84
    c. clad 24S-T80 d. clad 24S-T81. *

104. Which of the following is used for stiffeners and stringers
    a. clad 24S-T81 b. clad 24S-T84 *
    c. clad 24S-T86 d. clad 24S-T82.

105. Which of the following has excellent formability
    a. 75 ST b. 61 S *
    c. 24 S d. None.

106. Which of the following has poor formability
    a. 75 ST * b. 61 S
    c. 24 S d. None.

107. Which of the following requires heat treatment
    a. 17S * b. A17ST
    c. 53SO d. 53SW.

108. Where every pound of rivet strength is necessary which of the following rivets is used
    a. HS b. 24S
    c. both a. & b. * d. none.

109. Which of the following has better heading qualiters
    a. 17 S b. 24 S
    c. both a. & b. * d. none.

110. Which of the following clad redii is used for fully aged condition
    a. 24ST * b. 14SW
    c. 75SW d. all.

111. Which of the following is clad redii for freshly quenched material
    a. 24ST b. 14SW
    c. 75SW * d. all.

112. Which of the following has excellent corrosion resistance
    a. 53S material * b. pure aluminium
    c. both equal d. none.

113. Which of the following has excellent corrosion resistance and great strength
    a. 53S material b. pure aluminium
    c. 61S material * d. none.

114. Which of the following has better corrosion resistance
    a. 14ST b. R301-T
    c. 24ST * d. all.

115. Which of thefollowing is much more corrosion resistant
    a. 24ST * b. 17SO
    c. 24SO d. All.

116. Which of the following is used for primary structures requiring high strength
    a. 14S * b. 14S clad
    c. 17ST d. A17ST extrusions

117. Which of the following rivets are frequently used to avoid the necessity of heat treatment
    a. 14S b. 14S clad
    c. 17ST d. A17ST *

118. Which of the following is used for propeller blades and engine parts
    a. 32ST b. 25ST *
    c. 18ST d. none.

119. Which of the following is used for air craft engine pistons
    a. 25ST b. 32ST *
    c. 18ST d. all.

120. Which of the following is used for complicated engine parts
    a. 25ST b. 32ST
    c. A51ST * d. none.

121. For use where the corrosion resistance is of primary importance, the alloy used is
    a. 25ST b. A51ST
    c. 53S * d. 61S.

122. Which of the following has excellent forming characteristics
    a. A51ST b. 53S
    c. 61S * d. A51ST.

123. Which of the following is the strongest aluminium alloy
    a. 61SW b. R303 *
    c. R301 d. none.

■■■

CHAPTER - 40
MAGNESIUM ALLOYS

1. Magnesium alloy posses the charactoristics of
   a. high strength/weight ratio
   b. dampening capacity
   c. ease of machinability
   d. all above *

2. Few alloying elements only form solid solution with magnesium due to its
   a. rectangular crystals structure
   b. square crystal structure
   c. hexagonal crystal structure *
   d. triangular crystal structure

3. For magnesium alloy, following are the alloying elements
   a. Al, Ag, Zn, Mn, Zr and rare earth *
   b. Al, Cr, Ni, Zr, Ag
   c. Al, Co, Mo, Cu, Zn and rare earth
   d. none of the above

4. Disadvantages of magnesium alloy are
   a. poor, toughness and corrosion resistance *
   b. poor machinability
   c. poor workability

5. The influence of aluminium in magnesium is to
   a. decrease tensile, yield and compressive strength
   b. increase tensile, yield and compressive strength
   c. increase the ductility and castability
   d. obtain as b. & c. *

6. Manganese has
   a. maximum effect on mechanical properties of magnesium alloy
   b. increases resistance to corrosion
   c. improves weldability
   d. affects as per b. & c. *

7. Zinc influences the magnesium alloy
   a. to resist saline corrosion
   b. to improve castability
   c. for both above *
   d. for none of the above

8. Mark the correct statement
   a. silicon above 0.5% increases brittleness in magnesium alloy
   b. 1% silicon provides maximum tensile strength to Mg alloy
   c. silicon is not soluble in Mg alloy
   d. all above are correct *

9. Mg alloys are classified as
   a. cast alloys b. wrought alloys
   c. both above * d. none of the above

10. For Mg castings, with no advantage of work hardening, the strength is obtained by
    a. solid solution hardening
    b. precipitation or dispersion hardening
    c. grain re-finement
    d. all above *

11. The Mg cast alloy AZ 92 has
    a. the highest yield strength
    b. moderate elongation
    c. good pressure tightness
    d. all above *

12. The Mg cast alloy AZ-63A has
    a. maximum ductility
    b. intermediate yield strength
    c. usuages upto 150^0 C
    d. all above characteristics *

13. Mg alloy AZ 91 is suitable for
    a. die casting * b. mold casting
    c. sand casting d. all above

14. AM 100A mg alloy is used primarily for
    a. die casting
    b. permanent mold casting *
    c. sand casting
    d. none of the above

15. AM 100A mg alloy has
    a. excellant fluidity b. machineability
    c. weldability d. all above *

16. ZK-51A is
    a. die casting alloy b. sand casting alloy *
    c. mold casting alloy d. all above

17. ZK-51A posseses charactoristics of
    a. high strength and good ductility
    b. limited weldability
    c. both above *
    d. none of the above

18. ZH-62A Mg alloy has
    a. reasonable degree of castability
    b. excellent strength upto 150^0 C
    c. both above *
    d. none of the above

19. Mark the incorrect statement
    a. ZH-62A mg alloy becomes weaker above 150^0 C temperature
    b. castability of ZH-62A is above ZK-51A
    c. ZH-62A mg alloy has poor machineability *
    d. ZH-62A is the best mg alloy for strength/weight upto 150^0 C

20. Mg-Rare earth alloys includes
    a. Mg-rare earth-zerconium
    b. Mg-rare earth-zinc
    c. Mg-rare earth-Mn
    d. as in a. & b. *

21. The rare earth based mg alloys
    a. decreases creep resistance
    b. increases creep resistance
    c. are suitable for use upto 260^0 C
    d. as mentioned in b. & c. *

22. EZ-33A mg alloy
    a. is free from porosity
    b. have excellant pressure tightness
    c. can be used in temperature range of $150\text{-}260^0$ C
    d. has all above *

23. EZ-33A mg alloy
    a. is solution heat treated at 570^0 C for 18 hrs
    b. is artificially aged at 205^0 C for 16 hrs
    c. aged at 520^0 C/14 hrs
    d. is typically treated as a. & b. *

24. Mg-Th alloy group includes
    a. Mg-Th-Zn (HZ)
    b. Mg-Th-Zerconium (HK)
    c. both above *
    d. none of the above

25. Mg-Th alloys casts with
    a. no microporosity b. no hot cracking
    c. hot cracking d. as per a. & b. *

26. Mg-Th-rare earth mg alloy (misch metal) contains
    a. 50% cerium * b. 40% zinc
    c. 30% thorium d. none of the above

27. HK-31A Mg-Th alloy is in the form of
    a. casting b. wrought
    c. both above * d. none of the above

28. HK-31A Mag alloy is primarily casted by
    a. pressure molding b. sand casting *
    c. both above d. none of the above

29. HK-31A Mg-Th alloy posseses
    a. best creep resistance upto 260^0 C temperature
    b. excellant weldability
    c. good formability
    d. all above qualities *

30. HK-31A Mg-Th alloy is mostly used
    a. in aerospace applications
    b. missile applications
    c. where temperature is in the range of $150\text{-}315^0$ C
    d. as all above *

31. HZ-32A Mg-Th alloy is
    a. casting alloy b. wrought alloy
    c. both above * d. forging alloy

32. HZ-32A Mg-Th alloy posseses
    a. outstanding elevated temperature strength
    b. optimum creep resistance upto 260^0 C and above
    c. both above characteristics *
    d. none of the above

33. HZ-32 AA Mg-Th alloy has
    a. excellant machineability
    b. good weldability
    c. high strength/weight ratio
    d. all above *

34. For exposure of HZ-32A Mg alloy to corrosive conditions, it is to be
    a. chemically treated
    b. followed by painting
    c. done with as a. & b. *
    d. discarded

35. Wrought mg alloys are produced as
    a. bars and billets b. plates and sheets
    c. wires and forgings d. all above form *

36. Because of hexagonal structure of all mg alloys, the most forming operations are carried at temperature range of
    a. $100\text{-}150^0$ C b. $150\text{-}250^0$ C
    c. $250\text{-}350^0$ C * d. $350\text{-}450^0$ C

37. The main alloying elements of wrought magnesium alloys are
    a. Al, Mn, Zn & Zr * b. Al, Si, Fe, Zn
    c. Al, Mn, Si & Zr d. Al, Cr, Ni & Zr

38. The wrought mg alloys have
    a. lower compressive strength than tensile strength*
    b. higher compressive strength than tensile strength
    c. equal compressive and tensile yield strength
    d. high temperature applications

39. The wrought mg alloys are sub-divided in the following groups
    a. Mg-Mn and Mg-Al wrought alloy
    b. Mg-Zn wrought alloys
    c. Mg-Th wrought alloys
    d. all above *

40. MIA mg alloy is based on
    a. manganese * b. aluminium
    c. thorium d. zinc

41. MIA wrought mg alloy has
a. corrosion resistance
b. excellant weldability
c. hot formability
d. all above charactoristics *

42. AZ-31 B & C wrought mg alloy are produced as
a. forging
b. extruded bars & rods
c. tubing
d. all above *

43. Mark the correct statement
a. weldability of AZ 31 B & C is superior to AZ-31A wrought magnesium alloy
b. the higher calcium contents in AZ-31A makes weldability inferior
c. excessive Cu, Ni or Fe degrades the corrosion resistance in wrought mg alloys
d. all above are correct *

44. AZ-61A wrought mg alloy
a. is primarily extrusion and forging alloy
b. posseses good tonghness
c. is weldable and machineable
d. is as above *

45. AZ-61A wrought mg alloy is used upto temperature
a. 175^0C b. 150^0C
c. 180^0C d. 205^0C *

46. AZ-80 A Mg Al has
a. 8% aluminium
b. good resistance welding quality
c. limited ductility
d. all above qualities *

47. ZK-11 and ZK-31 are produced in the form of
a. sheets b. extrusions
c. both above * d. none of the above

48. ZK-60A wrought mg alloy is
a. heat treatable
b. produced in the form of extrusion and forging
c. possesing high strength properties
d. as above *

49. Mark the correct statement for ZK-60A mg alloy
a. its ductility and strength is high
b. has poor arc weldability
c. its application is at temperatures up to 150^0 C only
d. all above are correct *

50. ZK-60A wrought mg alloy is used for
a. low stressed parts
b. high stressed parts *
c. temperature applications above 150^0 C
d. none of the above

51. ZE-10A wrought mg alloy is
a. Mg-Zn-rare earth alloy
b. non heat treatable
c. available in the form of sheet and plates
d. as above *

52. ZE-10A mg alloy posses
a. good ductility
b. good weldability
c. both above qualities *
d. none of the above qualities

53. ZM-21A wrought magnesium alloy is
a. Mg-Zn-Mn alloy * b. Mg-Al-Zn alloy
c. Mg-Th-Zn alloy d. none of the above

54. ZM-21A mg alloy is principally produced in the form of
a. sheet b. extrusions
c. both above * d. none of the above

55. Manganese in ZM-21A alloy
a. minimise loss of strength for hot working or annealing
b. improves corrosion resistance
c. exert little effect in tensile properties
d. influences as above *

56. HK-31A
a. has outstanding properties upto 315^0 C
b. is used excessively for aircraft and missiles
c. can be solution heat treated
d. posses all above qualities *

57. HM-21A is in the group of
a. Mg-Al-Zn * b. Mg-Th-Mn
c. Mg-Th-Zn d. none of the above

58. HM-21A-T5 is considered
a. the strongest mg alloy
b. superior in creep resistance
c. useful in the range of $425\text{-}480^0$ C temperature
d. as all above *

59. Method of melting consists of
a. melting b. refining
c. both above * d. either of above

60. Melting is carried out
a. in clean mild steel crucibles
b. in air induction furnaces, oil or gas fired
c. as mentioned in a. & b. *
d. in stainless steel crucibles

61. From large melting units, the molten magnesium
a. is poured in small crucible at about 705^0 C *
b. is directly taken in large crucible for refining
c. is refined in the melting crucible itself
d. poured into molds

62. For refining the molten magnesium
    a. the small crucibles with molten magnesium is placed into furnace
    b. is further heated to refining temperatures
    c. after heating to refining temperature, it is cooled to casting temperature
    d. is processed as above *

63. To protect the crucible life erosion, it is not to be heated
    a. > 870^0 C *   b. > 900^0 C
    c. > 800^0 C   d. > 750^0 C

64. To achieve fine grain structure, the molten alloy is subjected to superheat of
    a. 200^0 C above melting point *
    b. 250^0 C above melting point
    c. 150^0 C above melting point
    d. none of the above

65. Finest grain of magnesium is obtained when
    a. it is super heated to 870^0 C
    b. molten metal is poured at temperatures from 740 to 825^0 C in molds
    c. both above operations are done *
    d. poured into mold at melting temperature

66. Oxidation resistance of magnesium is
    a. higher than aluminium b. poor than aluminium *
    c. same as aluminium   d. excellantly high

67. When magnesium is heated to 500^0 C, a layer is formed of
    a. mg oxide *   b. mg nitride
    c. both above   d. none of the above

68. Formation of mg nitride occurs when magnesium is heated above
    a. 870^0 C   b. 850^0 C *
    c. 500^0 C   d. 705^0 C

69. To protect the oxidation in magnesium when melting the suitable flux is used, i.e.,
    a. phosphorous   b. silicon
    c. sulphur *   d. none

70. To minimise oxidation during pouring
    a. sulphur is sprinkled on molten metal *
    b. sulphur is mixed with melt
    c. sulphur is added before melting in crucible
    d. nothing above is done

71. The magnesium alloys can be casted by
    a. sand molds   b. permanent molds
    c. die casting   d. all above methods *

72. Sand molds are used
    a. for large or intricate castings *
    b. when same pattern is produced in large numbers
    c. for small castings
    d. all above

73. Die casting is particularly adopted
    a. for quantity production
    b. for relatively small casting
    c. for dimensional accuracy
    d. for all above *

74. The dimensional tolerances of permanent molds are
    a. same as sand molds
    b. same as die casting
    c. intermediate between sand and die casting *
    d. better than die casting

75. Sand molds are required
    a. to be collapsible
    b. have oxidation prevention
    c. adequate venting and proper gating
    d. to have all above *

76. As magnesium has low heat content per unit of volume, for thin sand casting the melt to be introduced
    a. at single point   b. at a number of points *
    c. in heated sand beds   d. with special hot laddles

77. Some of the sand casting alloys, can be casted in permanent molds for
    a. exact size and better surface
    b. more accurate dimensions
    c. reduction in weight
    d. all above *

78. The permanent molds are usually made from
    a. white cast iron   b. grey cast iron *
    c. mild steel   d. wrought iron

79. To avoid cracks and achieve best results from permanent molds, these are prepared at the temperature range of
    a. 260-400^0 C *   b. 150-275^0 C
    c. 300-400^0 C   d. 250-350^0 C

80. When metal cores are employed in permanent mold castings, these are to be removed
    a. after full shrinkage of cast
    b. as soon as casting has set sufficiently
    c. before solidification shrinkages completes
    d. as per b. & c. *

81. Since metal cores and permanent mold does not collapse under shrinking pressure, to prevent the cracks in casting
    a. casting cycle is timed closely
    b. casting is removed sooner it is strong enough to hold dimensions
    c. casting is removed after full shrinkage
    d. a. & b. is strictly followed *

82. Die casting is adopted to meet the requirement of
    a. accurate dimension   b. uniformality
    c. superior finish   d. all above *

83. The main advantages with die casting are
   a. as very thin walls can be casted
   b. reduction in weight due to thin walls
   c. excellant surface quality
   d. all above *

84. For die casting , what is correct
   a. molten metal is injected under pressure from 28 to 345 MPa
   b. metal dies are water cooled
   c. molten metal is poured in heated metal die
   d. a. & b. are correct *

85. To die cast with maximum soundness
   a. metal should be injected slowly into die
   b. sufficiently high pressure must be provided after die is filled
   c. both above is adopted *
   d. none of the above procedure is required

86. The contineous stream of metal flow in die casting, prevents
   a. oxidation b. air cavities
   c. both above * d. nothing above

87. Magnesium alloy forgings of various shapes and sizes are used where
   a. height is required
   b. weight with rigidity required
   c. high strength is required
   d. all above is required *

88. Other outstanding qualities of magnesium alloy are
   a. pressure tightness b. machineability
   c. lack of warpage d. all above *

89. For open or closed die forging of magnesium alloys
   a. hydraulic presses are employed
   b. slow action mechanical presses are employed
   c. both above are commonly employed *
   d. sledge hammers are employed

90. During forging, magnesium alloy flows
   a. laterally * b. longitudinally
   c. all directions d. as a. & b.

91. Forging temperatures of magnesium alloy are in the region of
   a. 400^0 C with an working range of 20-50^0 C *
   b. 450^0 C with working range of 50-75^0 C
   c. 300^0 C with working range of 10-15^0 C
   d. 350^0 C with working range of 20^0 C

92. The forging pressure for magnesium alloys vary from
   a. 150-200 tons b. 200-500 tons *
   c. 300-400 tons d. 500-600 tons

93. For magnesium alloy forgings, what is true ?
   a. work pieces are heated to forging temperatures
   b. work pieces are heated in electrical furnaces
   c. forging dies are heated, not less than the forging temperature
   d. all above are true *

94. Wrought magnesium alloys are hot rolled to
   a. get large reductions without cracking
   b. avoid number of passes and re-heats
   c. produce sheet or plate thin enough to finish roll
   d. obtain all above *

95. Mg alloy work piece is pre-heated for rolling at the temperature range of
   a. 250-350^0 C b. 350-550^0 C
   c. 300-450^0 C * d. 150-350^0 C

96. During magnesium alloy rolling process, if temperature of work piece is droped below the specific limit, then
   a. process is kept in continuence
   b. work piece is re-heated *
   c. rolling is stopped at that thickness
   d. none of the above is done

97. Reduction perpass in hot rolling of magnesium alloy ranges from
   a. 5-10% b. 10-30% *
   c. 30-40% d. none of the above

98. For hot rolling of mg alloys the mill speed is, usually
   a. 40-45 rpm * b. 65-75 rpm
   c. 50-60 rpm d. 15-25 rpm

99. Commonly observed problems with wrought magnesium alloy rolling are
   a. "alligatoring" b. edge cracking of sheets
   c. both above * d. none of the above

100. "Alligatoring" defect, during mg alloy rolling may be due to
   a. inadequate scalping of ingot surfaces
   b. existances of secondary phases in cast structures
   c. both above reasons *
   d. none of the above reasons

101. Edge cracking of sheets during mg alloy rolling is caused due to
   a. propagation of shear crack inclined as compression bounds
   b. improper roll condition
   c. lack of lubrication
   d. all above *

102. Magnesium alloys are extruded as
   a. round rods
   b. variety of bars
   c. tubes and other shapes
   d. all above *

103. Magnesium alloys can be extruded
   a. hot b. cold
   c. as solid solution d. as per a. & b. *

104. Cold extrusions are carried out below the
   a. 200^0 C b. 100^0 C
   c. 75^0 C d. 300^0 C *

105. Commonly method employed for mg alloy extruding is
 a. direct * b. indirect
 c. either of above d. none of the above

106. Force generally applied for magnesium alloy extruding is in the range of
 a. 1700-13200 tons *
 b. 0800-1100 tons
 c. 10000-15000 tons
 d. none of the above

107. Magnesium alloys whose alloying contents are comparatively very low, can be extruded at a rate of
 a. 10 to few hundred meters per minute *
 b. 50 to few hundred metres per minute
 c. 80 to few hundred metres per minute
 d. none of the above

108. The optimum width to thickness ratio(w/r) for magnesium extrusions, normally is
 a. less than 20 * b. more than 20
 c. less than 30 d. more than 30

109. The soundness of magnesium alloy extrusion depends upon
 a. good symmetry of work piece
 b. lesser or nill sharp outside corner
 c. non-breakage of die during operation
 d. all above *

110. The magnesium alloys are usually heat treated to
 a. improve the mechanical properties
 b. condition the alloy for specific fabrication
 c. meet both above requirements *
 d. hardened and tempered

111. Magnesium alloys are heat treated for
 a. annealing
 b. stress relieving
 c. solution treating and ageing
 d. all above *

112. Type of heat treatment selected for mg alloy depends upon
 a. alloy composition
 b. product form i.e. cast/wrought
 c. both above *
 d. none of the above

113. Solution heat treatment to magnesium alloy results in
 a. improved strength b. maximum toughness
 c. shock resistance d. all above qualities *

114. Artificial ageing after solution treatment gives
 a. maximum hardness
 b. maximum yield strength
 c. slightly reduced toughness
 d. all above *

115. Artificial ageing done, without pre-solution treatment or annealing to mg casting alloys improves
 a. toughness b. ductility
 c. both above * d. tensile strength

116. Annealing of products
 a. reduces tensile strength
 b. increase ductility
 c. enhance fabricability
 d. provides all above *

117. To improve the mechanical properties of magnesium alloy HM-21(sheet)
 a. solution treatment is adopted
 b. strain hardening is adopted
 c. age hardening is adopted
 d. combination of all above is adopted *

118. Depending on alloy, the wrought magnesium alloy can be annealed at the temperature range of
 a. 300-350^0 C * b. 400-450^0 C
 c. 300-455^0 C d. 355-500^0 C

119. Stresses induced in wrought magnesium alloys, due to working and weldings, are relieved by heating for
 a. 15 to 60 hrs * b. 10 to 30 hrs
 c. 40 to 80 hrs d. none of the above

120. Residual stresses are induced in mg alloy castings due to
 a. non-uniform cooling after heat treatment
 b. machining operations
 c. both above conditions *
 d. none of the above conditions

121. Magnesium castings are subjected to stress relieving by
 a. heating from 260 to 330^0 C for 1 to 2 hours *
 b. heating from 100 to 150^0 C for 8 hours
 c. heating from 350 to 450^0 C for 16 hours
 d. heating from 200 to 300^0 C for 5 hours

122. To avoid fusion of eutectic compounds and resultant formations of voids, the Mg-Al-Zn alloy are solution treated
 a. by loading into furnace at 260^0 C
 b. by loading into furnace at 360^0 C
 c. as in a., then raise temperature slowly to solutionising temperature
 d. as per a. & c. *

123. For Mg-Al-Zn alloy the typical time duration for solution treatment is
 a. 1 hour b. 2 hours *
 c. 3 hours d. 4 hours

124. For solution treatment of mg alloy HK-31A, the rapid heating to solutionising temperature is needed to
 a. prevent grain coarsening *
 b. prevent granullar corrosion
 c. quick ageing d. none of the above

125. Magnesium alloys are comparatively more prone to corrosion, but corrosion resistance may be improved by controlling the impurities, such as
   a. iron b. nickel
   c. copper d. all above *

126. To protect the mg alloys from corrosion,the chromate treatment is provided by
   a. chrome-manganese chromating
   b. RAE hot half hour chromating
   c. acid chromating
   d. all above methods *

127. Mark the correct statement for Cr-Mn chromating
   a. produces black film on Mg-al alloys and alloys containing Zr and Zn
   b. produces dark brown pleasing appearance on Mg-Mn binary alloys
   c. produces blotchy chromate film on Mg-Al chill casted alloys
   d. all above are correct *

128. RAE hot half hour chromating
   a. may cause some dimensional losses
   b. produces chocolate brown to brown black film
   c. does both above actions *
   d. does none of the above actions

129. Since acid chromating has strong cleansing action, it is not recommended for
   a. parts with critical dimensions
   b. tapped holes
   c. screw threads
   d. all above *

130. Acid chromating method is suitable for
   a. Mg-Mn alloy parts
   b. Unmachined mg alloy part
   c. both above *
   d. none of the above

131. ML-5 magnesium based casting alloy has
   a. less tendency towards hot cracking
   b. high mechanical properties to sustain heavy loads
   c. high fluidity and welding charactoristics
   d. all above *

132. ML-5 mg casting alloy is developed by
   a. HAL Koraput Div. *
   b. HAL Bangalore Div.
   c. HAL Hydrabad Div.
   d. Bharat Aluminium Co. Ltd.

133. ML-5 mg casting alloy has melting temperature range of
   a. 430-600^0 C *
   b. 500-650^0 C
   c. 350-400^0 C
   d. none of the above

134. Mark the correct statement for ML-5 mg casting alloy
   a. density 1.81 g/cm^3
   b. linear shrinkage 1.1 to 1.2%
   c. both above are correct *
   d. both above are wrong

135. ML-5 mg alloy casting is used to make
   a. accessories gear casing of aeroengine R25, F25
   b. brake drums, brake shoes etc.
   c. control stricks, bell crank and brackets etc.
   d. all above *

136. Mg alloy ML-7-1 is a heat resistant alloy. It is used on aero engines with medium load carrying applications, upto
   a. 150^0 C b. 200^0 C *
   c. 250^0 C d. 300^0 C

137. Mg alloy ML-7-1 is developed by
   a. HAL Koraput Div. * b. HAL Bangalore Div.
   c. Bharat Al. Co. Ltd. d. Hindustan Al. Co. Ltd.

138. Melting range of ML-7-1 mg alloy is
   a. 450-650^0 C b. 505-610^0 C *
   c. 375-520^0 C d. none of the above

139. Mg alloy ML-7-1 has
   a. density 1.76 g/cm^3
   b. linier shrinkage 1.2-1.5%
   c. both above *
   d. none of the above

140. Mark the correct statement regarding wrought magnesium alloy ZM-21A (Mg-Mn-Zn alloy)
   a. it has high strength to weight ratio
   b. batter damping capacity
   c. it is used for missile applications for 200^0 C order
   d. all above are correct *

141. Wrought magnesium alloy ZM-21A is developed by
   a. M/S Defence Metallurgical Research Laboratory
   b. M/S Mishra Dhatu Nigam Ltd.
   c. M/S Super Inducto Castings Pvt. Ltd.
   d. all above *

142. Pure magnesium weighs ----------------- as much as aluminium
   a. 60 % b. 50 %
   c. 65 % * d. 55 %.

143. For incendiary bombs
   a. magnesium alloy is used *
   b. pure magnesium is used
   c. sodium is used
   d. sodium alloy is used

144. Magnesium is commonly alloyed with
   a. aluminium b. zinc
   c. manganese d. all *

145. Specific gravity of manganese is
 a. 1.8 * b. 1.6
 c. 2.8 d. 2.6.

146. Use of magnesium
 a. increases the weight of the part
 b. decreases the weight of the part *
 c. don't alter the weight
 d. all of the above.

147. Magnesium alloys are
 a. non sparking
 b. non magnetic only
 c. magnetic only
 d. both a. & b. *

148. Magnesium is never found in
 a. pure forms * b. ores
 c. impure form d. none.

149. Magnesium carbonate stands for
 a. dolomite b. magnesite *
 c. carnalite d. none.

150. Dolomite is also called as
 a. magnesium calcium carbonate *
 b. magnesium carbonate
 c. magnesium & potassium carbonate
 d. all

151. Carnalite stands for
 a. magnesium calcium carbonate
 b. magnesium carbonate
 c. magnesium & potassium carbonate *
 d. all.

152. 500 pounds (i.e. highest) magnesium per ton is available in
 a. magnesite * b. dolomite
 c. carnallite d. all.

153. Smaller magnesium amounts 160 pound/ ton available in
 a. magnesite b. dolomite
 c. carnalite * d. all.

154. Every 770 pounds of ocean water contains
 a. one pound of magnesium *
 b. two pond of magnesium
 c. three pond of magnesium
 d. four pond of magnesium.

155. Magnesium has
 a. high strength/ weight ratio *
 b. low strength/ weight ratio
 c. both
 d. none.

156. Common impurities found in magnesium are
 a. iron b. nickel
 c. copper d. all. *

157. The notch sensitivity of magnesium alloys to fatigue
 a. same as that of aluminium alloy
 b. greater than that of aluminium alloy *
 c. less than that of aluminium alloy
 d. none.

158. In which of the following case, magnesium alloy is used ?
 a. bell cranks b. control column
 c. brake pedals d. all. *

159. In which of the following forms, the magnesium alloy is found ?
 a. sand casting b. mold casting
 c. die casting d. all above *

160. In which of the following treatment the alloying ingredients rema in the solid solution ?
 a. solution heat treatment *
 b. aging
 c. stabilizing
 d. all of the above.

161. Which of the following treatment minimizes growth at elevated temperature ?
 a. solution heat treatment
 b. Aging *
 c. stabilizing
 d. all of the above.

162. Which of the treatment provides high creep strength?
 a. solution heat treatment
 b. aging
 c. stabilizing *
 d. none.

163. The largest use of magnesium alloys is in
 a. mold casting b. sand casting *
 c. die casting d. none .

164. If the shape of casting permits free contraction a shrinkage factor of 11/64 inch/foot, the alloy to be used is
 a. aluminium alloy
 b. magnesium alloy
 c. combination of both a. & b. *
 d. none of the above.

165. If free shrinkage is restricted by bosses gates, risers, internal cores the shrinkage factor is ---------- inch /ft.
 a. 1/16 b. 1/8 *
 c. 1/32 d. 3/16.

166. The maximum temperature recommended when alloy are stabilized or aged is
 a. 350° F * b. 350°C
 c. 300°F d. 300°C

167. Microporosity may occur in
 a. Magnesium-alloy-castings *
 b. aluminium-alloy-castings
 c. copper-alloy-castings
 d. none.

168. Which of the following composition has high strength among magnesium alloy ?
a. composition A * b. composition B
c. composition C d. All of the above.

169. Which of the following composition under magnesium alloy has good stability and less subjected to micro porosity ?
a. Composition A b. Composition B
c. Composition C * d. All of the above.

170. Which of the following have good welding as well as good Corrossion resistance ?
a. Composition A b. Composition B *
c. Composition C d. All of the above.

171. Which of the following is used for pressure tight casting ?
a. Composition A b. Composition B
c. Composition C * d. All of the above.

172. Which of the following is used for welding application in tanks ?
a. Composition A b. Composition B *
c. Composition C d. All of the above.

173. For aircraft landing wheels, the casting process adopted is / are
a. sand casting
b. permanent mold casting
c. die casting
d. all of the above *

174. Magnesium alloys are commercially available in the form of
a. extrusions b. forging
c. sheet d. All of the above *

175. Magnesium alloys have ratio of modulus of elasticity to specific gravity
a. greater than steel
b. greater than aluminium
c. equate steel & aluminium *
d. none of the above.

176. Which of the following magnesium alloy have highest test ?
a. AN - M - 24 b. AN - M - 25 *
c. AN - M - 27 d. AN - M - 20.

177. Which of the following alloy has the best cold forming properties ?
a. AN - M - 24 b. AN - M - 25
c. AN - M - 27 * d. AN - M - 20.

178. Which of the following alloy has the best elongation and good Corrossion resistant ?
a. AN - M - 24 b. AN - M - 25
c. AN - M - 27 * d. AN - M - 20.

179. Which of the following alloy specification covers extruded tubing made from the same alloy as ? A N - M - 24
a. AN - T - 71 * b. AN - M - 72
c. AN - M - 73 d. all of the above.

180. Which of the following specification covers extruded tubing made from the same alloy as AN - M - 27 ?
a. AN - T - 71 b. AN - M - 72 *
c. AN - M - 73 d. none.

181. Which of the following specification covers extruded tubing made from same alloy as AN - M - 26 ?
a. AN - T - 71 b. AN - M - 72
c. AN - M - 73 * d. all.

182. Which of the following are ideal for screw stock ?
a. AN - M - 24 b. AN - M - 25
c. both a. & b. * d. AN - T - 71.

183. Which of the following are not true for magnesium alloy forgings
a. they are sound proof
b. light in weight
c. they are pressure tight
d. none of above *

184. Which of the following forging magnesium alloy has good formability
a. AN - M - 20 b. AN - M - 21
b. AN - M - 22 d. both a. & b. *

185. Which of following magnesium alloy does not have good Corrossion resistance or strength ?
a. AN - M - 20 b. AN - M - 21
b. both a. & b. * d. AN - M - 23.

186. Which of the following sheet has best gas weldability?
a. AN - M - 28 b. AN - M - 24
c. AN - M - 30 * d. none.

187. Which of the following magnesium sheet has excellent arc welding characteristic ?
a. AN - M - 28 * b. AN - M - 29
c. AN - M - 30 d. none.

188. Which of the following magnesium sheet has best combination of fatigue & shear strength ?
a. AN - M - 28 b. AN - M - 29 *
c. AN - M - 30 d. none

189. Which of the following is a low cost magnesium alloy of moderate strength ?
a. AN - M - 28 b. AN - M - 29
c. AN - M - 30 * d. all.

190. Which of the following has excellent arc welding characteristics ?
a. AN - M - 28 * b. AN - M - 29
c. AN - M - 30 d. all.

191. Which of the following has very good hot formability?
 a. AN - M - 28 * b. AN - M - 29
 c. AN - M - 30 d. none.

192. Which of the following magnesium sheet alloy has low notch sensitivity ?
 a. AN - M - 28 b. AN - M - 29 *
 c. AN - M - 30 d. none.

193. Which of the following magnesium sheet alloy has the best resistance to creep at elevated temperature
 a. AN - M - 28 b. AN - M - 29
 c. AN - M - 30 * d. none.

194. Magnesium has ------------------ as compared to aluminium
 a. lower modulus of elasticity *
 b. higher modulus of elasticity
 c. both a. & b.
 d. none of the above.

195. Depth of tapped holes should be how many times the diameter of stud
 a. 2 b. 3
 c. between a. & b. * d. none of the above.

196. Band or circular saws for cutting magnesium alloy should have
 a. 4 teeth per inch b. 7 teeth per inch
 c. none d. between a. & b. *

197. Single cut files are preferable for use with
 a. magnesium alloys *
 b. aluminium alloys
 c. both a. & b.
 d. none of the above

198. The sheared edge may be improved by shearing, which is
 a. single shearing operation
 b. double shearing operation *
 c. triple shearing operation
 d. none of the above.

199. Maximum allowable clearance between punch & the die essential for magnesium alloy during blanking & punching is
 a. 4% b. 5% *
 d. 3% d. 6%.

200. Recrystallization of magnesium alloy during forming
 a. decreases tensile strength *
 b. increases tensile strength
 c. decreases ductility
 d. all of the above.

201. A heat resistant form block is used in
 a. hand forming * b. bending
 c. extrusion bending d. tube bending

202. If the quantity is too small then
 a. hand forming should be used *
 b. bending should be used
 c. extrusion bending should be used
 d. none.

203. AM - T - 71 and AN - T - 72 alloys can normally be bent at
 a. lower temperature
 b. very high temperature
 c. at room temperatute *
 d. all

204. Cylindrical cups can be deep drawn to a depth x times their diameter in a single draw . Where x is
 a. 1 b. 1.5 *
 c. 2 d. 2.5.

205. Which of the following is used to fabricate circular articles ?
 a. Drop hammering b. Spinning *
 c. Stretch forming d. Roll forming.

206. Which of the following is used for obtaining double curvature of a surface ?
 a. Drop hammering b. Stretch forming *
 c. Roll forming d. Die forming.

207. Which of the following is not practicable in general
 a. Drop hammering * b. Stretch forming
 c. Roll forming d. Die forming

208. Which of the following used for production of shapes with thin wall that can not be extruded ?
 a. Roll forming b. die forming
 c. both a. & b. * d. Stretch forming

209. In stretch forming the temperature is normally used in the range of
 a. 450°F b. 550°F
 c. between a. & b. * d. more than 550°F

210. Severe re-heating is required in
 a. drop hammering * b. stretch forming
 c. roll forming d. die forming.

211. Which are the specific considerations for riveting on the part of magnesium alloy ?
 a. driving technique b. Corrossion protection
 c. design of joint d. all *

212. For aircraft flush riveting, the magnesium alloy used is
 a. 535 - T 61 b. 5650
 c. 565 1/4 H * d. none .

213. In gas welding any article used with minimum thickness of
 a. 0.66 inch b. 0.064 inch *
 c. 0.065 inch d. 0.067 inch.

214. Which of the following type of magnesium alloy is called as chrome - pickle - treatment ?
 a. type I * b. type II
 c. type III d. type IV.

215. Type IV of magnesium alloy AN - M - 12 is called as together
 a. chrome - pickle treatment
 b. sealed chrome pickle treatment
 c. dichromate treatment
 d. galvanizeo anodizing treatment *

216. Which of the following treatment is recommended for use up to 1.5 × manganese type alloy
 a. Chrome pickle treatment
 b. Sealed chrome pickle treatment
 c. Dichromate treatment
 d. Galvanic anodizing treatment *

217. In metal - to - metal contact moisture causes
 a. Environmental Corrossion
 b. Galvanic Corrossion *
 c. Surface contamination
 d. stress Corrossion.

218. Metallic impurities in surface, in case of magnesium alloy causes
 a. Environmental Corrossion
 b. Galvanic Corrossion
 c. Surface contamination Corrossion *
 d. Stress Corrossion

219. Internal residual stresses subject to Corrossion in case of
 a. Environmental Corrossion .
 b. Galvanic Corrossion
 c. Surface contamination Corrossion
 d. Stress Corrossion *

220. Welding flux resulting from gas welding should be removed by chrome pickling to prevent
 a. Environmental Corrossion .
 b. Galvanic Corrossion
 c. Surface contamination Corrossion *
 d. Stress Corrossion.

221. Sheet metals of magnesium alloy AN - M - 28 and AN - M - 29 are basically subjected to
 a. Environmental Corrossion .
 b. Galvanic Corrossion
 c. Surface contamination Corrossion
 d. Stress Corrossion *

222. Heat treatment is essential to remove
 a. Environmental Corrossion .
 b. Galvanic Corrossion
 c. Surface contamination Corrossion
 d. Stress Corrossion *

223. In general, the magnesium alloy AN - M - 30 usually subjected to
 a. Environmental Corrossion .
 b. Galvanic Corrossion *
 c. Surface contamination Corrossion
 d. Stress Corrossion.

224. Two parts of unequal thickness can be spot welded togather if electrode used is of
 a. larger contact area *
 b. smaller contact area
 c. any of a. & b.
 d. none.

225. In which of the following, Corrossion surface subjected to cracking or fracture with outany prior evidence ?
 a. Galvanic corrosion
 b. Surface Corrossion *
 c. Environmental Corrossion
 d. Stress Corrossion.

226. A coating of non porous magnesium hydroxide is given on magnesium alloy to prevent
 a. Environmental corrossion *
 b. Galvanic corrossion
 c. Surface contamination
 d. Stress corrossion

227. Two coats of zinc chromate primer on the facing surface prevent
 a. Environmental Corrossion
 b. Galvanic Corrossion *
 c. Surface contamination
 d. Stress Corrossion

228. As compared to gas welding, arc welding is of
 a. less warpage *
 b. more warpage
 c. equal warpage
 d. none.

■■■

CHAPTER - 41
AIRCRAFT MATERIAL TESTINGS

1. In aircraft construction it is essential that material used should have ____________ strength/weight ratio.
   a. low b. high *
   c. medium d. intermediate

2. Which of the following is a definite indication of the maximum applied load
   a. yield strength * b. tensile strength
   c. stress d. strain

3. 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

4. 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. $\pm 4\frac{1}{2}$ %

5. 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

6. 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

7. 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

8. The extensometer must be calibrated to read __________ inch or less.
   a. 0.0002 * b. 0.002
   c. 0.02 d. 0.0004

9. Radiography is a ___________ method of locating cracks by means of X-rays or gamma rays.
   a. destructive b. non-destructive *
   c. creative d. sensitive

10. The following is a magnetic powder
    a. black iron oxide
    b. Fe_3O_4
    c. Ca_2O
    d. both a. and b. *

11. Materials subject to vibrational stresses have frequently failed at much ___________ loads than anticipated.
    a. smaller * b. higher
    c. reduces d. none of the above

12. 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

13. Which of the following loads are selected for set method.
    a. 20% * b. 16%
    c. 15% d. 10%

14. Which of the following loads are selected for the set method
    a. 75% * b. 55%
    c. 65% d. 85%

15. Which of the following loads are selected for the set method
    a. 65% b. 85%
    c. 55% d. 90% *

16. Which of the following loads are not selected for the set method
    a. 20% b. 75%
    c. 90% d. 80% *

17. 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.

18. 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.

19. 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 *

20. Modulus of elasticity of which of the following metals is highest
a. steel *
b. aluminium alloys
c. magnesium
d. corrosion resisting steel

21. Modulus of elasticity of which of following metals is lowest
a. steel
b. aluminium alloys
c. magnesium *
d. corrosion resisting steel

22. Modulus of elasticity of steel is
a. 30×10^6 lb/inch^2 * b. 25×10^5 lb/inch^2
c. 20×10^4 lb/inch^2 d. 15×10^3 lb/inch^2

23. Modulus of elasticity of aluminium alloys
a. 10×10^6 lb/inch^2 * b. 15×10^6 lb/inch^2
c. 25×10^6 lb/inch^2 d. 35×10^6 lb/inch^2

24. Modulus of elasticity of magnesium
a. 65×10^5 lb/inch^2 * b. 55×10^5 lb/inch^2
c. 35×10^5 lb/inch^2 d. 75×10^5 lb/inch^2

25. Modulus of elasticity of corrosion-resisting steel is
a. 25×10^6 lb/inch^2 * b. 15×10^6 lb/inch^2
c. 10×10^6 lb/inch^2 d. none of the above

26. Magnaflux is an ___________ process.
a. inspection * b. creation
c. corrosion d. manufacturing

27. Which of the following process indicates cracks, seams, laps and non-metallic inclusions
a. magnaflux * b. normalizing
c. annealing d. anodizing

28. 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

29. It is essential that all parts of the airplane structure be free from ___________.
a. cost b. crack *
c. dirt d. dust

30. For steel the fatique limit is about __________ of the ultimate tensile strength.
a. 0.5 * b. 0.4
c. 0.2 d. 0.3

31. 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

32. Which materials have higher tensile strengths and fatique limits
a. annealed materials b. heat treated materials *
c. both have same d. none of the above

33. Flattening test is a/an
a. bending test * b. impact test
c. torsion test d. inspection test

34. Izod test is a/an
a. bending test b. impact test *
c. torsion test d. inspection test

35. Charpy test is a/an
a. bending test b. impact test *
c. torsion test d. inspection test

36. Impact test is a
a. static test b. dynamic test *
c. torsional test d. none of the above

37. 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. *

38. The impact blow on specimen is delivered by
a. a dropping weight b. a swinging pendulum
c. a rotating flywheel d. all above *

39. 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

40. 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

41. 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 *

42. 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

43. Usually metals fail when subjected to
a. repeated loading and unloading *
b. reverse stresses
c. just loading
d. all above stresses and strains

44. 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

45. 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

46. 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 *

47. The Brinell test is the
    a. rebound hardness testb. wear hardness test
    c. indentation test * d. all above

48. 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

49. 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

50. 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 *

51. 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 *

52. 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

53. While hardness test is carried out on very hard steels it is required that ball should not show a permanent change of more then 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

54. 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. *

55. 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

56. Mechanical test may be conducted under various loading conditions i.e.
    a. static b. dynamic
    c. repeated or fatigue d. all above *

57. 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

58. Tension and compression test are carried out by providing
    a. static loads * b. dynamic loads
    c. repeated loads d. any of the above

59. 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 *

60. 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 *

61. The specimen for tensile test, before being put in the machine, is marked with two marks for "gauge length", which is usually :
    a. 1" b. 2" *
    c. 3" d. 1½"

62. An instrument called extenso-meter is attached to the specimen to measure :
    a. Compression b. Elongation *
    c. Distortion d. All of the above

63. During tensile test stress can be read on dial and strain can be found out, since
    a. elongation is known
    b. original gauge length is known
    c. the overall length of specimen is known
    d. elongation and gauge length is known *

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CHAPTER - 42
FUTURISTIC MATERIALS

1. The futuristic designs of aero space technologies are being developed with the major consideration of
   a. minimised noise and pollution
   b. fuel economy and lower direct costs
   c. longer life with systems reliability
   d. all above *

2. For future, a set of performance objective for advanced gas turbine engine has been formed to
   a. raise TIT by 500^0 C
   b. operate in stochiometric combustion conditions
   c. reduce the density of material and component cooling
   d. obtain all above *

3. Stochiometric combustion of jet fuel occurs at
   a. 1100^0 C b. 1700^0 C
   c. 2200^0 C * d. 900^0 C

4. Primary need of advanced material are
   a. light weight, higher operating temperature
   b. greater stiffness and reliability
   c. affordability
   d. as all above *

5. Presently dominating research and development base are
   a. high temperature engineering ceramic
   b. low ductility anisotropic hymats
   c. high temperature resistance titanium alloys
   d. as a. & b. *

6. Mark the incorrect statement
   a. ceramic has high temperature strength
   b. ceramic has a batter ductility *
   c. metals are moderate in strength and ductility
   d. metals resists temperature in proportion to their density

7. Presently the aerospace material market is dominated by
   a. al-alloy
   b. special steels
   c. super alloys & titanium
   d. all above *

8. Accepted industrial datas indicate that
   a. 1 kg weight reduction in aircraft saves 35 gallons of fuel annually
   b. 1 kg weight reduction in missile saves 6-8 kg of fuel
   c. each kg of weight reduction in aircraft saves 100 gallons of fuel annually
   d. datas as per a. & b. are correct *

9. Conventional wrought aluminium alloys which dominate aerospace market presently are
   a. 2XXX and 7XXX * b. 4XXX and 6XXX
   c. 5XXX and 7XXX d. 3XXX and 5XXX

10. Al-li alloys developed recently, for structural applications are most
    a. cost effective
    b. weight saving
    c. temperature resistant
    d. cost effective & weight saving *

11. For every 1% of lithium addition in al alloy there is
    a. 3% decrease in density
    b. 10% increase in stiffness to density ratio
    c. 10% decrease in density
    d. difference as mentioned in a. & b. *

12. It is estimated that by replacing conventional al alloy with al-li alloys the weight of the largest aircraft can be reduced by
    a. 10 tons b. 7 tons
    c. 5 tons * d. 8 tons

13. Common compositions of al-li alloys are
    a. Li-Cu-Mg
    b. Zr-Fe-Si
    c. Mn-Li-Sn
    d. combination of a. & b. *

14. Titanium possesses
    a. stiffness
    b. multi directional strength
    c. toughness
    d. all above properties *

15. The use of titanium is highest in
    a. commercial aircraft
    b. military aircraft *
    c. executive aircraft
    d. all above

16. Recent titanium alloys Ti-1100 and IMI-834 is developed for use upto
    a. 500^0 C b. 550^0 C
    c. 575^0 C d. 595^0 C *

17. Titanium alloys Ti-1100 and IMI 834 is used for
    a. airframe structures
    b. compressors *
    c. high temperature pressure lines
    d. all above

18. SP-700 titanium is used for
a. airframe structures
b. compressors
c. super plastic formed components *
d. all above

19. Timetal-21 S (beta 21 S) titanium alloy is specially used for
a. high temperature ducting pressure lines *
b. aircraft structure
c. super plastic formed components
d. none of the above

20. SP-700 titanium alloy is of
a. high formablity b. high strength
c. japan origin d. all above *

21. Three decades before jet engines were containing steel by 40% of weight but presently it is reduced to nearly below
a. 20% b. 30%
c. 25% d. 13% *

22. Steels in compressors and turbines have been replaced by
a. aluminium alloy b. nickel base alloys
c. titanium alloys d. by both as b. & c. *

23. Usages of steel in aircraft structure is also considerably reduced by % aircraft weight of
a. ≈ 15% b. ≈ 5%
c. ≈ 7% * d. ≈ 12%

24. Landing gears of aircraft were made of steel and are being made of steel presently, U/C shares the % weight of aircraft by
a. 2% b. 6%
c. 4% * d. 8%

25. Competition from newer material would positively hinge on
a. cost effectiveness
b. strength at high temperatures
c. resistance to corrosion
d. all above *

26. During abortive take offs the brake drum temperature can rise to
a. 300-350^{0}C b. 350-400^{0}C
c. 400-450^{0}C d. 500-550^{0}C *

27. Objectives to develope steel grades that would help in reducing
a. flying cost b. flying risks
c. both above * d. none of the above

28. With development of turbine cooling designs, the nick base alloys are successfully being used as load bearing engine structure at ____________ of their absolute melting temperature
a. 0.6 b. 0.7
c. 0.8 d. 0.9 *

29. To enhance the high temperature stability of super alloys it is emphasised on
a. cleanliness b. soundness
c. refinement d. all above *

30. Grain boundry ductility improvement for directionally solidified blades were obtained by
a. addition of hafnium
b. retention of grain boundry strengthner
c. both above *
d. none of the above

31. For mono crystal blades, elimination of boundary strengtheners resulted in increase in incipient melting by
a. 50^{0}C b. 70^{0}C
c. 90^{0}C * d. 110^{0}C

32. A super strength single crystal alloy CMSX-4G is developed using rhenium as alloying material to promote
a. high temperature oxidation
b. creep resistance
c. better fatigue behaviour
d. all above *

33. CMSX-4G single crystal alloy is having temperature advantage over existing alloys by
a. 30% b. 50% *
c. 70% d. 90%

34. Ticolloy has
a. higher strength
b. improved microstructural stability
c. as a. & b. with operating temperature advantage of 27^{0}C
d. all above *

35. Eliminating non-metallic inclusion in ln-718 super alloy exhibit low cycle fatigue life more than conventionally refined method by
a. four times b. six times
c. ten times * d. none of the above

36. Metals and alloys are inferior to ceramic in
a. high temperature strength
b. stability
c. specific gravity
d. all above *

37. Super alloys are preferred then ceramics to use in gas turbine engines, because of
a. TET is in working range
b. poor ductility of ceramic
c. lack of reliability of ceramic
d. all above *

38. Ceramic was restricted to applications where
a. high temperature existed
b. compressive loads existed *
c. tensile loads existed
d. all above existed

39. Newly developed ceramics in USA are called
    a. high performance ceramics
    b. high tech ceramics
    c. advanced ceramics
    d. all above *

40. Newly developed ceramics in Japan is called
    a. fine ceramics b. new ceramics
    c. both above * d. none of the above

41. Basically the ceramic is
    a. hoplessly brittle
    b. difficult to form in close tolerance
    c. erratic mechanical behaviour
    d. all above *

42. With research and developments the modern ceramics are
    a. three times stronger
    b. with flexural modulus near to 725 MPa
    c. regarded as true engineering ceramics
    d. as all above *

43. Today aluminas based on silica or boron are regarded as true engineering
    a. ceramics b. carbides
    c. nitrides d. all as a., b. & c. *

44. The top contenders for high strength ceramics are
    a. silicon carbides
    b. silicon nitride
    c. combination of both above
    d. all above *

45. Carborundum's silicon carbides have replaced the military rocket nozzles costly alloys, i.e.
    a. graphite b. W-alloys
    c. both above * d. nickel alloys

46. The use of ceramic in rocket nozzles has enhanced maintenance of critical
    a. nozzle orfice diameter b. rocket speed
    c. trajectory d. as all above *

47. Critical nozzle orfice dia gets eroded by
    a. high velocity gases
    b. excessive temperatures
    c. abrasive particle discharge from solid fuel *
    d. all above

48. New ceramics have been developed to find the application for
    a. bullet proof jackets b. gas turbine engines
    c. good shock resistance d. all above *

49. At development levels, it has been postulated and prototypes built are
    a. all ceramic engine without coolant or lubricant
    b. Japanese ceramic engine for automobile
    c. rolls royce's all non-metallic aero-engine demonstrator
    d. as above *

50. The major challange in designing high temperature ceramics is
    a. toughness * b. strength
    c. hardness d. all above

51. NT 154 Si_3N_4 ceramic material is sucessfully used, for automative and auxiliary power turbines to make
    a. rotors
    b. spin disks, stators & rotors
    c. vane seat platforms
    d. all above *

52. The commercial realities of ceramic are
    a. rocket exhausts b. space radiator tubes
    c. both above * d. none of the above

53. Many researchers opine about ceramic technology
    a. that too much, too soon is expected
    b. unfamiliar material are adopted for aeroengines
    c. it is to be first tried on less demanding applications
    d. all above *

54. Ceramic matrix composites are being developed to
    a. increase strength
    b. increase toughness
    c. bring closer to actual applications
    d. all above *

55. LAS glass ceramic matrix, reinforced with sic fiber increases
    a. four fold strength
    b. six fold toughness
    c. twice the strength and toughness
    d. as per a. & b. *

56. For the preparation of well integrated fiber reinforced CMCs, there should be ideal
    a. slurry infiltration
    b. chemical vapour infilteration
    c. controlled oxidation of metal precursor
    d. as per a., b. & c. *

57. Whisker ceramic matrix composites have good strength at room and elevated temperatures, but also have
    a. increased chemical reactivity
    b. poor oxidation resistance
    c. toxic effects and costly
    d. all above *

58. Long fiber preformed composites are produced by
    a. using CVD polymer-pyrolysis
    b. sol-gel techniques
    c. using reaction bonding
    d. using all above *

59. Infilteration preformed multi-directional fiber array is used to produce
    a. whisker CMC
    b. long fiber preformed composites
    c. hot pressed composites
    d. all above composites *

60. Long fiber-slurry/ hot pressed are produced by
 a. drawing through matrix powder slurry
 b. as in a, then drying, stacking and hot pressing
 c. method mentioned in a. & b. *
 d. not above mentioned method

61. A new hot pressed composite is developed for use in space launch vehicle 'skylon' containing
 a. 40% volume of contineous silicon carbides fiber
 b. refractory glass-ceramic matrix
 c. both above *
 d. none of the above content

62. Super plasticity is achieved in yttria-stablised tetragonal zirconia containing
 a. Al_2O_3 (Al_2O_3/Y - TZP)
 b. 20% Sic - Si_3N_4
 c. Fe-Fe_3C
 d. all above *

63. The new CMC developed in Japan for use in gas turbine engine contains
 a. $Al_2O_3 + Si_3N_4$
 b. Si C fibers (2% wt)
 c. both above compositions *
 d. nothing above

64. $Al_2O_3 + Si_3N_4$ CMC has strength of
 a. 1100 MPa at 1300^0 C b. 650 MPa at 1500^0 C
 c. 1100 MPa at 1500^0 C d. a. & b. *

65. Al_2O_3/BC (15% wt) CMC have, comparing to particulate reinforced alumina
 a. 35% higher toughness
 b. 92% higher flexural strength
 c. 50% higher toughness and strength
 d. as per a. & b. *

66. A new class of engineering material is carbon-carbon composites which are
 a. ceramic in nature
 b. unique, all carbon composite
 c. made with carbon fiber and carbon matrix
 d. as said in all above *

67. For carbon carbon composites, the fiber may be
 a. chopped b. wooven
 c. conteneous d. as all above *

68. For carbon carbon composites, the fiber may be produced from
 a. rayon
 b. polyacrylonitrile (PAN)
 c. pitch (mesophase or isotropic)
 d. any of the above *

69. For carbon-carbon composites, the carbon matrix can be deposited by
 a. chemical vapour deposition
 b. carbunization of thermoplastic
 c. carbunization of thermosettings
 d. any of the above method *

70. The carbon-carbon composit possesses the properties, which may be
 a. multi-dimentional
 b. tailered for a range of application
 c. as both above *
 d. not as above

71. Unlike metals and ceramics, the carbon-carbon composites
 a. retain their strength at very high temperatures
 b. possess high thermal conductivity
 c. low thermal expansion
 d. possess all above qualities *

72. C/C fiber products are used in
 a. aircraft brakes
 b. rocket nozzle
 c. nose cones and ablatives
 d. all above *

73. C/C composites have the advantages of
 a. chemical resistance
 b. dimensional stability
 c. high temperature resistance
 d. all above *

74. C/C composites are ideal for use in
 a. space environments due to its intertness
 b. chemical plants
 c. corrosive environments
 d. all above locations *

75. The C/C composites have severe drawback as
 a. it is extremely expensive to produce
 b. it gets readily oxidised above temperature of 400^0C
 c. mentioned in a. & b. *
 d. it is brittle, weak and highly expansive

76. The C/C composites becomes costly due to
 a. costly material
 b. slow processing method
 c. in-efficient existing processes
 d. all above *

77. Polymers are
 a. hard
 b. light and most ductile *
 c. brittle
 d. tough

78. Certain polymers, viz, polyther sulfone (PES) resin
 a. offers good rain erosion resistance
 b. have microwave transparency
 c. possesses both above qualities *
 d. very poor resistance to rain erosion

79. Aircraft radomes are made of
 a. ceramic composites b. C/C composites
 c. PES resins * d. all above

80. Cross-linkable epoxy thermoplastic offers
 a. excellant compressive strength
 b. damage tolerance property
 c. moisture resistance capability
 d. all above *

81. CET resins are quite suitable for primary structure of
 a. sub sonic aircraft * b. transonic aircraft
 c. super sonic aircraft d. all above

82. Hymats the hybrid materials are produced by combination of
 a. metals b. ceramics
 c. polymers d. two or all above *

83. The duel combination of polymer with metal or ceramic have resulted in emergence of
 a. cermets b. polymets
 c. polycers d. all above *

84. Selective combination of metals, ceramics and polymers have resulted in
 a. polycermets b. macrolaminates
 c. both above * d. none of the above

85. Cermets are the materials which are
 a. metals
 b. ceramics
 c. between metal and ceramic *
 d. stronger than metal & ceramic

86. Engineering combinations of cermets have been tailered to achieve in terms of
 a. high temperature capability
 b. lower density
 c. a menability to conversions
 d. all above *

87. Successfully achieved cermet combinations are
 a. oxide dispersion strengthened (ODS) alloys
 b. intermetallics
 c. composites
 d. all above *

88. ODS alloys are
 a. anisotropic b. not weldable
 c. as both above * d. as none of the above

89. For fabrication of ODS alloys ___________ is adopted
 a. brazing b. diffusion bonding
 c. both a. & b. * d. none of the above

90. ODS alloys have
 a. limited tensile strength upto 1000^0 C
 b. highest tensile strength upto 1000^0 C
 c. poor thermal fatigue charactoristics
 d. as per a. and c. *

91. Inconel MA 754 has
 a. batter creep rupture
 b. super plastic charactoristics under high strain
 c. both above charactoristics *
 d. none of the above charactoristics

92. Inconel MA 6000 alloy
 a. is stronger at high temperature
 b. is comparable with single crystal alloys
 c. is used for turbine vanes
 d. is all as mentioned in a, b. & c. *

93. First stage blade made from inconel MA 6000 alloy
 a. can with stand very high temperature
 b. operates with cooling system
 c. operates with out cooling
 d. stands as per a. and c. *

94. Incoloy MA 956 is used to make
 a. combustion chambers b. after burners
 c. turbine casings d. all above *

95. Aluminium base ODS alloys exibits a maximum elongation of 1000% at
 a. 425^0 C b. 525^0 C *
 c. 625^0 C d. 725^0 C

96. Inco MAP AL-9052 aluminium base ODS alloy has ultrafine grains size, mechanical alloying is obtained from aluminium
 a. oxides b. carbides
 c. nitrides d. oxides & carbides *

97. Inco MAP 905 X L aluminium base ODS alloy possesses
 a. lower density b. greater stiffness
 c. greater hardness d. as a. & b. *

98. INCO MAP 905 X L aluminium ODS alloy is widely used for
 a. military aerospace applications
 b. airframe applications *
 c. marine crafts
 d. all above

99. AL-Li +Al_4C_3 ODS alloy is dispersion strengthened with carbon black to produce Al_4C_3 has been found suitable for
 a. airframe structures b. space structures *
 c. marine structures d. all above

100. Inter metallic compounds possesses
 a. high temperature properties with low density
 b. high yield strength and elastic modulus
 c. resistance to creep corrosion and oxidation
 d. all above qualities *

101. Intermetallic compounds have drawbacks of
 a. low fracture toughness
 b. poor ductility
 c. both above *
 d. none of the above

102. Titanium aluminides possesses
 a. lower density
 b. better temperature capabilities
 c. both above *
 d. severe brittleness

103. The most favoured intermetallic compound Ti Al has
 a. density 3.7 g/cm^3
 b. good resistance to oxidation
 c. relatively high modulus of elasticity
 d. all above qualities *

104. Mark the incorrect statement
 a. titanium aluminium expectedly replace the high pressure compressor blades
 b. properties of Ti_3 Al is well publicised and known well *
 c. titanium aluminides are adopted for sensitive military use
 d. properties of Ti_3 Al are mostly of classified nature

105. Pure titanium aluminide is
 a. very brittle * b. ductile
 c. tough d. none of the above

106. To improve the ductility of titanium aluminides
 a. 10-16% of zinc is added
 b. 10-16% nickel is added
 c. 10-16% niobium is added *
 d. all above is added

107. Recently developed orthorhombic titanium aluminides Tiz (Al.Nb) exibits
 a. excellant room temperature formability
 b. high temperature mechanical properties
 c. very hardness
 d. as per a. & b. *

108. Mark the correct statement
 a. single crystal nickel aluminides are very ductile
 b. polycristalline nickel aluminides are brittle
 c. addition of 1% boron in poor aluminium alloy improves ductility
 d. all above statements are correct *

109. Nickel aluminides of Ni_3Al+B+Hf combination possesses
 a. ductility b. strength
 c. oxidation resistance d. all above *

110. Addition of iron and chromium to nickel aluminides strongly increases
 a. strength * b. ductility
 c. brittleness d. none of the above

111. Nickel aluminides can be successfully processed through
 a. powder metallurgy b. ingot metallurgy
 c. both above * d. none of the above

112. In contrast to Ni_3 Al the Ni Al-alloy with addition of boron
 a. achieves excellant room temperature ductility
 b. does not achieve room temperature ductility *
 c. achieves greater brittleness
 d. achieves nothing above

113. Intermetallics of Nb Al_3 has
 a. low density
 b. high melting temperature
 c. low thermal expansion
 d. all above qualities *

114. Nb Al_3 intermetallic suffers from
 a. poor oxidation resistance
 b. poor ductility
 c. poor toughness
 d. all above *

115. Al.Ru intermetallic is
 a. of low density with high melting temperature
 b. a good impact resistant at ambient temperature
 c. less ductile
 d. as all above *

116. The addition of boron in Al Ru intermetallic
 a. reduces ductility
 b. increases ductility *
 c. provide no change in ductility
 d. improves oxidation resistance

117. Zr Ru intermetallics has high melting temperature of
 a. 3050^0 C b. 1600^0 C
 c. 2097^0 C * d. none of the above

118. Zr Ru intermetallics have use ful strength upto
 a. 1200^0 C b. 1600^0 C *
 c. 1400^0 C d. 1800^0 C

119. Zr Ru intermetallic possesses
 a. significant fracture toughness
 b. indentation, creep resistance
 c. both above qualities *
 d. none of the above qualities

120. $MoSi_2$ intermetallic has good strength and oxidation resistance upto
 a. 900^0 C b. 1000^0 C
 c. 1100^0 C d. 1200^0 C *

121. $MoSi_2$ intermetallic are very ductile below
 a. 900^0 C * b. 1000^0 C
 c. 1100^0 C d. 1200^0 C

122. Ni_3Si is a promising intermetallic and possess superplastic properties with elongation of
 a. 350% b. 450%
 c. 550% d. 650% *

123. Fe_3Al and FeAl intermetallics have
 a. excellant oxidation resistance
 b. excellant corrosion resistance
 c. both above qualities *
 d. none of the above qualities

124. The major drawbacks of Fe_3Al and FeAl aluminides are
 a. poor ductility at room temperature
 b. brittle at room temperature
 c. poor strength and creep resistance above 600^0 C
 d. all above *

125. Fe_3 aluminides are
 a. very ductile at room temperature
 b. very strong at higher temperature
 c. very brittle at room temperature *
 d. weaker metals

126. Fe Al looses strength and creep resistance above
 a. 500^0C b. 600^0C *
 c. 700^0C d. 800^0C

127. Ceramic fibers metal matrix composites (CF-MMCs) to meet the specific design requirements, properties
 a. can be tailored * b. can not be tailored
 c. can not be changed d. of fiber is attained

128. CF-MMC have potential for providing light weight components with
 a. more than double strength
 b. high stiffness and good wear resistance
 c. lower thermal co-efficient and higher temperature properties
 d. all above properties *

129. Metal matrix composites have been developed out of
 a. contineous ceramic fibers
 b. discontineous ceramic fibers
 c. both above type *
 d. ceramic matrix

130. MMCs promise, improved performance of
 a. engine rotating parts *
 b. engine stationary parts
 c. both rotating and stationary parts
 d. none of the above

131. MMCs provide
 a. reduced weight
 b. reduced viberations
 c. increased operating temperatures
 d. all above *

132. MMC of graphite fiber with copper base matrix is used to make
 a. combustion chamber *
 b. rocket nozzle
 c. heat exchanger
 d. all above

133. Si C fibers with Cu matrix MMCs are used for
 a. tubing b. rocket nozzles *
 c. fuselage d. none of the above

134. MMCs made with tungsten fiber with Cu matrix is used for
 a. NASP heat exchanger *
 b. blades & discs
 c. structural members
 d. all above

135. Composites made with tungsten fiber and iron based matrix are usually used to make
 a. tubing * b. blades and discs
 c. combustion chambers d. rocket nozzle

136. MMCs developed with tungsten fiber and nickel base matrix are used to make
 a. blades and discs * b. tubings
 c. structural members d. none of the above

137. Titanium based matrix used with Ti C fibers makes the suitable material for
 a. airframe structure
 b. shafts and honeycombs *
 c. both above
 d. none of the above

138. MMCs alumina/graphite with directionally solidified Al/Mg matrix are used for
 a. fuselage b. structural members
 c. both above * d. rocket nozzles

139. With Si C fiber and directionally solidified Al based matrix used to make
 a. wings b. blades
 c. both above * d. tubings

140. Fiber re-inforced Ti alloy Ti-6Al-4V + Si C at 815^0 C are for given weight
 a. three times stronger than super alloys *
 b. twice stronger than super alloys
 c. four times stronger than super alloy
 d. none of the above

141. Ti-6 Al -4V Ti alloy is produced by
 a. hot pressing the rows of Si C fibers between foils of Ti -6Al - 2V *
 b. cold pressing the fiber between the Ti - 6Al -2V matrix
 c. placing the fiber into molten matrix
 d. any of the above method

142. TaC fiber re-inforced nickel alloys are
 a. contineous fiber alloy *
 b. discontineous fiber alloy
 c. whisker re-inforced alloy
 d. of all above type

143. TaC fiber re-inforced nickel alloy is considered for
 a. structural applications
 b. blade applications *
 c. heat exchangers
 d. none of the above

144. Si C fiber re-inforced aluminium alloy provides weight saving of
 a. 40% b. 20%
 c. 60% * d. 30%

145. Si C fiber re-inforced aluminium is used for
 a. airframe components
 b. fins of missiles
 c. both above *
 d. none of the above

146. Si C fiber re-inforced copper alloys are developed to make
 a. heat exchangers for hypersonic aircraft engine *
 b. rocket nozzles
 c. structural components
 d. all above components

147. Graphite fiber re-inforced aluminium have co-efficient of expension
 a. low b. high
 c. very high d. nearly zero *

148. Graphite fiber re-inforced aluminium is used for
 a. airframe structures
 b. thermally stable structural components of space craft *
 c. load bearing components
 d. none of the above

149. Al_2O_3 short fiber re-inforced magnesium alloys have
 a. marginal property advantages
 b. light weights
 c. applications on auxilliary components
 d. all above *

150. Though MMCs are suitable for wide range of aerospace applications, they are limited to non-structural usage due to
 a. lack of property data
 b. lack of approperiate technology
 c. high cost
 d. all above *

151. Intermetallic matrix composites (IMCs) are the highest risk composit systems due to
 a. their inherent brittleness *
 b. weak structure
 c. heavy weight
 d. all above

152. IMCs offers the greatest potential for
 a. higher strength b. lighter weight material
 c. high temperatures d. all above *

153. IMCs typically have matrices based on
 a. aluminides b. silicides
 c. both above * d. none of the above

154. Ti_3 Al based IMCs with high niobium resulted in
 a. significant tensile strength
 b. good thermal fatigue resistance
 c. both above *
 d. none of the above

155. Based on orthorhombic phase $Ti_{3\ Al}$ Nb having
 a. improved specific strength
 b. batter low temperature ductility
 c. batter fracture toughness
 d. all above *

156. Based on orthorhombic phase Ti_2 Al composites have
 a. adverse effect at high temperature
 b. no adverse high temperature effects *
 c. nil ductility at low temperatures
 d. the properties as b. & c.

157. Ti-Al based composites (gamma TiAl + Al_2O_3) offers
 a. higher temperature specific strength
 b. stiffness capabilities
 c. both above qualities of higher value then Ti_3Al *
 d. none of the above

158. TiAl composit, alloyed with Cr, Si and Nb possess
 a. increased toughness
 b. increased ductility
 c. both above *
 d. high corrosion resistance

159. Ni Al matrix is being considered with contineous Mo and tungsten fiber to improve
 a. toughness b. strength
 c. both above * d. temperature properties

160. MoSi based composites shows excellant
 a. oxidation resistance b. electrical conductivity
 c. thermal conductivity d. all above qualitites *

161. $MoSi_2$ and its alloys through the addition of SiC whiskers improves significantly
 a. creep resistance b. temperature resistance
 c. fatigue resistance d. both above a. & b. *

162. Ti-24 Al - 11Nb + SCS SiC : Ti_3 Al ($\propto_2$) produced by either powder, foil or wire matrix with contineous length of SCS-6Si C fiber give dramatic improvement
 a. in weight reduction
 b. in strength
 c. batter then single crystal NAS AIR 100
 d. as all above *

163. Use of Ti Al cold rolled foil has been made to produce honey comb structure as a
 a. viable cost effective process *
 b. very costly process
 c. non-viable on commercial lines
 d. still under developing process

164. Polymets are the combination of
    a. fiber of metal and polymer matrix
    b. polymer fiber with metal matrix
    c. either way as above *
    d. not the one as above

165. Polymets, due to their light weight and comparative performance at required temperatures are expected to replace metals in
    a. advance aerospace structures
    b. avionics
    c. both above *
    d. none of the above

166. Polymer fiber metal matrix composites (PF-MMCs) are mostly focussed on systems consisting of
    a. blend of CP aluminium
    b. high temperature crystalline plastics
    c. both above *
    d. none of the above

167. Some of the thermotropic liquid crystal co-polysters used for polymets are
    a. xydar or vectra b. xydar and vectra
    c. either of the above * d. none of the above

168. Some of the high temperature crystalline thermoplastics are as
    a. polyether
    b. ether ketone
    c. combination of both as (PEEK)
    d. all above *

169. Comparing to CP aluminium the yield strength of polymets is
    a. lower b. 3% lower
    c. 15.9% higher * d. 20% higher

170. Polycer are
    a. polymer-ceramic hybrids *
    b. metal-ceramic hybrids
    c. both above
    d. none of the above

171. Polymer matrix composites (PMCs) are most widely used composit system with graphite fiber re-inforced
    a. epoxy b. poly sulfone
    c. polymides d. all above *

172. Most of PMCs are
    a. dimensionally stable structure
    b. unstable dimensionally
    c. contenders for space vehicles
    d. as mentioned in a. and c. *

173. For aerospace structural applications, the properties desired as
    a. tensile properties
    b. co-efficient of thermal expansion
    c. solar emittance and absorption
    d. all above *

174. The main drawbacks to process PMCs are
    a. high processing temperature
    b. toolings for high temperature
    c. thermal stresses
    d. all above *

175. Graphite/epoxy are the basic materials for fuel tank of NASP the actual space exposure of graphite/epoxy indicated
    a. atomic oxygen erosion is directly proportional to fiber
    b. atomic oxygen erosion is inversely proportional to fiber *
    c. no oxygen erosion
    d. excessive oxygen erosion

176. Glass fiber re-inforced thermo plastic compositions possess
    a. elevated temperature properties *
    b. highest strength/weight ratio
    c. high electrical and thermal conductivity
    d. all above qualities

177. Glass fiber re-inforced composites have matrix region with
    a. polyther sulfone (PES)
    b. polythermide (PET), poly phenylene sulphide (PPS)
    c. poly-etherketone (PEK) & poly ether-polyetherketone (PEEK)
    d. all above *

178. PEK, PEEK and PPS composites loose their tensile strength, rapidly upto around
    a. 100^0 C b. 150^0 C
    c. 200^0 C * d. 250^0 C

179. The highest strength among all PMCS of class is possessed by
    a. 30 wt% glass/PEK * b. 30 wt%/PES
    c. 30 wt%/PET d. 30 wt%/PEEK

180. Polycermats are the combination of
    a. polysters b. metals
    c. ceramics d. all above *

181. Polycermats are
    a. super hybrid composites
    b. presently made in the form of ulaminates
    c. made with fibers of PMCs sandwitched between thin sheets of metal
    d. as mentioned in a, b. & c. *

182. Presently polycermats available commercially are
    a. ARALL b. GLARE
    c. both above * d. none of the above

183. Mark the correct statement
    a. ARALL is registered as ALCOA
    b. GLARE is registered as AKZO
    c. ARALL is registered as AKZO
    d. a. & b. are correct statements *

184. ARALL and GLARE have
    a. layers of high strength aluminium sheets
    b. ceramic fiber re-inforced polymers (PMCs)
    c. layers of zinc sheets with ceramic re-inforced PMCs
    d. as mentioned in a. & b. *

185. Polycermat composite layers are
    a. stacked
    b. cured
    c. prestrained after curing
    d. done with all above in series *

186. The polycermat laminates have charactoristics of ; in comparision with conventional aluminium
    a. 50 to 20% lower density
    b. 60% higher directional strength
    c. higher stiffness
    d. all above *

187. ARALL and GLARE polycermats possess
    a. damping ability and lightening strike resistance
    b. improved damage tolerance and bi-axial capability
    c. enhance machinability and lower costs
    d. all above qualities *

188. GLARE polycermats has
    a. enhanced machinability
    b. formability
    c. impact and moisture resistance
    d. all above *

189. Polycermats are used for
    a. fuselage, lower wing skins
    b. tail structures
    c. tear strips, hatches and doors
    d. all above *

190. Al-Li alloys for LCA are being developed by
    a. IISc b. Midhani
    c. DMRL d. a. and c. *

191. Al-Mg-Si alloys developed by BALCO is used by
    a. IGMPD * b. LCA project
    c. KAVERI project d. all above

192. Titanium alloys developed by Midhani are used for
    a. LCA b. KAVERI
    c. SLV d. all above *

193. Steels for LCA, IGMDP, MiG and Adour is developed by
    a. DMRL b. IISC
    c. Midhani * d. all above

194. Super alloys developed by Midhani is used on
    a. Kaveri b. Adour
    c. both above * d. none of the above

195. Monolithic ceramics developed by CG & CRI are exclusively used for
    a. bearings *
    b. navigational equipments
    c. cutting tools
    d. all above

196. Monolithic ceramics used for navigation systems is developed by
    a. CG & CRI b. DMRL
    c. REC (W) d. both as b. & c. *

197. Ceramics matrix composites (CMCs) developed by DMRL is used for
    a. cutting tools * b. navigation systems
    c. bearings d. all above

198. C/C composites for IGMDP (nose cone) is developed by
    a. DMRL b. DRDL *
    c. NPL d. CG & CRI

199. Brake pads of LCA are made from
    a. monolithic ceramics b. C-C composites *
    c. steels d. super alloys

200. Laser resistance CMC used by aerospace industry is developed by
    a. NPL * b. DRDL
    c. DMRL d. REC (W)

201. ODS alloys used by aerospace is developed by
    a. NPL b. NAL *
    c. DMRL d. none of the above

202. ODS super alloy technology is developed by
    a. NPL b. NAL
    c. UOR * d. DMRL

203. Cermats (ODS alloys) Al/Al_2O_3 and Al/SiO_2 developed by IISc is used to make
    a. pistons b. bearings
    c. both above * d. brake pads

204. RRL specifically developes ODS alloys
    a. $Al/Zr\,O_2$ b. $Al/Ti\,O_2$
    c. Al/Al_2O_3 d. as per a. & b. *

205. Intermetallic compounds, titanium aluminides are developed by
    a. RRL b. NPL
    c. DMRL * d. IISc

206. Titanium aluminides are used to make
    a. turbine blades b. compressor blades *
    c. exhaust cones d. none of the above

207. Ceramic fiber/whiskers/particulate- MMC are developed by
    a. IISc b. RRL
    c. HAL and DMRL d. all above *

208. Al/graphite MMC is developed by
    a. IISC b. RRL
    c. both above * d. NPL

209. Al/SiCp MMCs are developed by
a. IISc b. RRL
c. HAL and DMRL d. all above *

210. Al/Si Cp MMCs are used to make
a. laser mirrors
b. subtrates of night vision devices
c. space tubes
d. all above *

211. Al/TiC, Al/B_4C and Al/Ti B_2 CMCs are developed for process developments exclusively by
a. NPL b. NAL
c. DMRL * d. RRL

212. Maraging steel MDN 250A is developed by
a. Midhani * b. DMRL
c. IISc d. none of the above

213. Maraging steel is used by
a. LCA project b. IG MDP
c. Kaveri project d. a. & b. *

214. Super alloy, super ni 718A developed by Midhani is used for
a. LCA b. SLV
c. Kaveri * d. all above

215. 12% Cr steel AE 961W developed by Midhani is used on
a. MiG * b. Kaveri
c. Adour d. LCA

216. Steel Z12 CNDV 12 developed by Midhani is exclusively used on
a. LCA b. Kaveri
c. Adour * d. SLV

217. Super ni 263A developed by Madhani is used on
a. SLV b. Kaveri
c. Adour d. both on b. & c. *

218. Polymets, polymers-PMCs are developed as
a. Kevlar b. Aramid
c. Epoxy d. all above

219. Polymers-PMCs polymets are developed by
a. IIT b. HAL (F&F)
c. both above * d. DMRL

220. Kevlar, aramid and epoxy composites are used on
a. ALH * b. LCA
c. SLV d. none of the above

221. Ceramic-PMCs are developed by
a. DMRL b. IIT
c. HAL (F&F) d. both as b. & c. *

222. Ceramic PMCs, glass fiber/epoxy composites are used on
a. LCA b. SLVs
c. ALH * d. all above

223. Carbon fiber-epoxy composites are
a. polymer PMCs b. ceramic PMCs *
c. both above d. none of the above

224. Carbon fiber-epoxy composites are developed by
a. Indian Institute of Technology
b. Hindustan Aeronautics Ltd. (F&F)
c. both above *
d. none of the above

225. Carbon fiber-epoxy composites (CFC) are used on
a. light combat aircraft
b. space launch vehicles
c. advance light helicopters *
d. all above

226. For airframe structure titanium alloys used are
a. beta C, Ti-10-2-3 b. Ti-15-333
c. Ti-6-22-22 d. as above in a., b. & c. *

227. Al/Mica MMC is developed by
a. NPL b. RRL
c. DMRL d. IISC *

■■■

CHAPTER - 43
CERAMIC MATERIALS

1. Ceramics are -------------------- material.
   a. Organic   b. Inorganic *
   c. Metallic   d. None of the above.

2. Ceramics are used at
   a. High temperature *
   b. Low temperature
   c. Low moisture in atmosphere
   d. None of the above

3. Ceramics are ------------------ material.
   a. Metallic   b. Nonmetallic *
   c. Organic   d. Both (a) & (c)

4. Ceramics are
   a. Ductile   b. Soft & Ductile
   c. Hard & Brittle *   d. None of the above.

5. Ceramic possesses
   a. Abrasion resistance   b. Heat resistance
   c. Both (a) & (b) *   d. Neither (a) nor (b).

6. Ceramics can sustain large compressive loads even at
   a. Low temperature
   b. High relative humidity
   c. High temperature *
   d. None of the above.

7. The nature of the chemical bond in ceramics is generally
   a. Ionic *   b. Co-valent
   c. Both (a) & (b)   d. Neither (a) nor (b)

8. Carbides, borides, nitrides are ------------------- constituent of ceramic material.
   a. Anions *   b. Cations
   c. Both (a) & (b)   d. Neither (a) nor (b)

9. Whiteware which includes china clay and porcelain is -------------- material.
   a. Ceramic *   b. Organic
   c. Composite   d. None of the above.

10. Glass is a ------------------ material.
    a. Ceramic *   b. Organic
    c. Composite   d. None of the above.

11. Whiteware is a
    a. Clay-based product *   b. Glass based product
    c. Fibre-based product   d. None of the above.

12. Almost all structural clay products are made by
    a. Stiffmud process   b. Soft-mud process
    c. Both (a) & (b) *   d. None of the above.

13. Glass is a transparent ----------------- product.
    a. Fibre   b. Zircon
    c. Silica *   d. None of the above.

14. Glass is a --------------- product.
    a. Organic   b. Inorganic *
    c. Ductile   d. None of the above.

15. An abrasive is commonly made of a
    a. Ceramic material *
    b. Cast Irons
    c. Nodular Iron
    d. Semi hypereutectic material

16. Abrasive possesses
    a. Softness   b. Good softness
    c. High Hardness *   d. Poor hardness

17. An abrasive is used for
    a. Grinding   b. Cutting
    c. Both (a) & (b) *   d. Welding

18. Synthetic abrasives are preferred because of
    a. Ununiformity of hardness
    b. Uniformity of softness
    c. Greater uniformity of hardness *
    d. None of the above.

19. To manufacture silicon carbide, sand, coke and saw dust are mixed and a high temperature electrical arc (------------------) is passed through the mixture for a long time.
    a. 4500°F *   b. 3200°F
    c. 6700°F   d. 3925°F

20. Silicon carbide has trade name as -----------------
    a. Silicatendum   b. Carborundum
    c. Carboridium *   d. None of the above.

21. Silicon carbide is used for making
    a. Grinding wheels *   b. Piston rings
    c. Cylinder head   d. None of the above.

22. Silicon carbide is used as a
    a. Refractory material *   b. Inhibitors
    c. Exhibitors   d. Light material

23. Al_2O_3 obtained by heating aluminium salts or from ------------------ ore.
    a. Bacsanite   b. Hametite
    c. Bauxite *   d. Cementite

24. Al_2O_3 has a colour --------------------- than Si C.
a. Lighter * b. Darker
c. Same as d. Colourless

25. Al_2O_3 is ------------ harder than Si C.
a. Less * b. More
c. Equal d. None of the above.

26. Electrical insulators are generally _________ materials and they prevent the flow of electrical current through them.
a. Ceramic * b. Fibrous
c. Organic d. None of the above.

27. An insulator or dielectric has a specific resistance in the range of ------------------ ohm.cm.
a. 10^4 to 10^9 b. 10^6 to 10^{20} *
c. 10^9 to 10^{27} d. 10^8 to 10^{26}

28. Insulator Materials can breakdown under high
a. electrical voltages * b. electrical potential
c. electrical current d. loads

29. Insulators are glazed to make them
a. absorbent b. non absorbent *
c. brittle d. ductile

30. Insulators are resistance less sensitive
a. Impurities * b. Slags
c. Current d. Casting defects

31. Asbestos is a --------------------- material
a. Organic material b. Inorganic conductor
c. Insulator & ceramic * d. None of the above.

32. Mylar is a --------------------- material.
a. Elastic insulator b. Plastic insulator *
c. Plastic conductor d. None of the above.

33. A Rock is a --------------------- material.
a. Homogeneous b. Unhomogeneous *
c. Both (a) & (b) d. Neither (a) nor (b)

34. Rock possess
a. Definite shape b. No definite shape
c. Definite texture d. Both (b) & (c) *

35. Rock is a
a. Crystalline solid b. Poly crystalline solid *
c. Semi-crystalline solid d. None of the above.

36. Igneous rocks are formed due to the solidification of molten materials known as --------------- from inside the earth.
a. Sagma b. Magma *
c. Aptima d. None of the above.

37. Crystallization of Plutonic rocks takes place inside (--------------) the surface of earth.
a. Above 45m b. Above 75 m
c. Above 30 m d. Above 35 m *

38. Granite, Gabro, Diorite etc. are examples of
a. Igneous rock b. Plutonic rock *
c. Hypabassal rocks d. Volcanic rocks

39. Plutonic rocks find application in ------------------
a. Casting
b. Foundation of Machines only
c. All building construction purposes *
d. None of the above.

40. Crystallization of hypabassal rocks takes place near earth's surface.
a. About 30-35 m * b. About 70-80 m
c. About 40-60 m d. About 42-92 m

41. Hypabassal rock gets ------------------ time for cool.
a. Less * b. More
c. Average d. None of the above

42. Hypabassal rock possess
a. Fine crystal * b. Coarse crystal
c. Fibrous grains d. None of the above.

43. Dolerite is a
a. Igneous rock b. Hypabassal rock *
c. Volcanic Rock d. None of the above.

44. Magma possesses
a. Fast cooling rate * b. Slow cooling rate
c. Average cooling rate d. None of the above.

45. Volcanic rocks are highly
a. Soft b. Non porous
c. Porous * d. None of the above.

46. Basalt is an example of
a. Igneous rocks b. Plutonic rocks
c. Volcanic rocks * d. Metamorphic rocks

47. Limestone is a --------------------- rock.
a. Igneous b. Sedimentary *
c. Volcanic d. Plutonic

48. Dolomite is a --------------------- rock.
a. Volcanic b. Sedimentary *
c. Plutonic d. None of the above.

49. Cherts are
a. Igneous rock b. Plutonic
c. Volcanic d. Sedimentary *

50. Chemically or biochemically deposited sediments are the result of chemical precipitation of _________
a. Calcium carbonate * b. Calcium sulphate
c. Calcium carbide d. Calcium phosphate

51. Metamorphic rocks form from
a. Igneous rock b. Sedimentary rock
c. Both (a) & (b) * d. Volcanic rock

52. Metamorphic rocks are comparatively
a. Hard * b. Soft
c. Less strong d. Less tough

53. Metamorphic rocks are comparatively
a. Strong b. Durable
c. Tough d. All of the above *

54. Due to metamorphic action, Limestone changes into
a. Marble * b. Quartz
c. Gneiss d. None of the above.

55. Due to Metamorphic action, Sandstone changes into
a. Quartz * b. Marble
c. Gneiss d. None of the above

56. Due to metamorphic action, Granite changes into
a. Marble b. Gneiss *
c. Quartz d. None of the above.

57. Building stones are obtained from
a. Igneous rock b. Volcanic rock
c. Natural rock * d. None of the above.

58. A good building stone should have high strength (crushing strength > ----------------------- kg/cm^2)
a. 1000 * b. 2000
c. 4000 d. 3922

59. Coefficient of hardness of a good building stone should be
a. > 10 b. > 14 *
c. < 2 d. < 5

60. A good building stone should possess
a. Low water absorption *
b. High water absorption
c. Less strength
d. More ductility

61. A good building stone should possess
a. Weather resistance
b. Good Appearance
c. Resistance to wear & fire
d. All of the above *

62. Basalt and Trap stones are found in
a. Madhya Pradesh b. Bengal
c. Maharastra d. All of the above *

63. Granite is found in
a. Uttar pradesh b. Punjab
c. Himachal Pradesh d. Assam *

64. Crushing strength of granite is
a. 900 to 1700 Kg/cm^2 b. 770 to 1300 Kg/cm^2 *
c. 925 to 1550 Kg/cm^2 d. 900 to 1200 Kg/cm^2

65. Gneiss are found in
a. Bengal * b. Kerala
c. Orissa d. Punjab

66. Crushing strength of gneiss is __________ Kg/cm^2.
a. 1800 b. 1700
c. 2100 * d. 2300

67. Gneiss are used in
a. Foundation of structure
b. Paving Slabs *
c. Roofing
d. Flooring

68. Crushing strength of limestone is ------------------- Kg/cm^2
a. 550 * b. 650
c. 750 d. 850

69. Crushing strength of laterite is --------------- to--------- Kg/cm^2.
a. 12 to 48 b. 10 to 50
c. 18 to 32 * d. 13 to 19

70. Marble is found in -------------------
a. Bihar b. Andhra Pradesh
c. Rajsthan * d. Orissa

71. Crushing strength of Marble is ------------------- Kg/cm^2
a. 620 b. 820
c. 720 * d. 920

72. Slate Rocks are found in
a. Uttar Pradesh * b. Goa
c. Daman and Diu d. Gujarat

73. Crushing strength of slates are in between
a. 400 to 1920 Kg/cm^2 b. 300 to 1320 Kg/cm^2
c. 900 to 1300 Kg/cm^2 d. 770 to 2110 Kg/cm^2 *

74. Slates found use in
a. Roofing b. Flooring
c. Ornamental carving d. Both (a) & (b) *

75. Crushing strength of sandstone is _________ Kg/cm^2
a. 950 b. 1250
c. 650 * d. 1150

76. Sand stone are used in
a. Ornamental carving *
b. Flooring
c. Roofing
d. Inferior type stone masonry work.

77. Quartzite is found in
a. Haryana b. Punjab
c. Goa d. Himachal Pradesh *

78. Port land cement is a ---------------- cement.
a. Hydraulic Calcium Silicate *
b. Hydraulic Aluminium Silicate.
c. Hydraulic silicon carbide
d. Hydraulic calcium carbonate

79. Portland cement sets and hardens by taking up water in complex chemical reactions, a process called
a. Hydration * b. Hydrogenation
c. Hydroxidation d. Reinforcement

80. Chemical action of hydration is completed within
a. 48 hours b. 24 hours *
c. 2 days d. 1 day

81. Alumina ceramics are used in
a. Rocket nose cones * b. Crank shaft
c. Piston rings d. None of the above.

82. Silicon carbide or molybdenum disilicate are used in making of
a. Rocket Nozzles * b. Air Frame
c. Wings d. None of the above.

83. Uranium oxide (UO_2) is a
a. Organic material b. Ceramic material *
c. Polymer d. None of the above.

84. Uranium works as a
a. Ignitor element b. Fuel element *
c. Both (a) & (b) d. Neither (a) nor (b)

85. Laser materials are also part of the field of
a. Organic materials b. Polymers
c. Ceramics * d. All of the above.

86. Glass ceramic crystalline phase have
a. High thermal expansion
b. Low thermal expansion
c. Zero thermal expansion *
d. None of the above.

87. Desirable characteristics of glass ceramics include a very
a. Low thermal expansion coefficient *
b. High Coefficient of thermal expansion.
c. Both (a) & (b)
d. Very high thermal expansion.

88. Cermets are a class of material containing both
a. Ceramics & steels only
b. Ceramics & Iron only
c. Ceramics & Metals *
d. None of the above.

89. Cermets are used in
a. Jet engines *
b. Automobiles industry
c. Where higher oxidation rate is required.
d. None of the above.

90. Cemented carbide is a
a. Metal b. Organic material
c. Cermets * d. All of the above.

91. Tungsten carbide or titanium carbide extensively used as
a. Cutting tools * b. Cast components
c. Artillary equipments d. None of the above.

92. Electrical insulators can breakdown under ------------- electrical voltage.
a. High * b. Low
c. Average d. All of the above.

93. Ferrites are complex multiple oxides of
a. Iron oxide * b. Copper oxide
c. Aluminium oxide d. None of the above.

94. Permanent-type ceramic magnets are primarily of the
a. Barium ferrite type *
b. Barium silicate type
c. Barium oxide type
d. None of the above

95. Magnetite (Fe_3O_4) is a
a. Organic Insulator
b. Ceramic-Insulator
c. Ceramic-Semi conductor *
d. None of the above.

96. Fe_3O_4 (Magnetite) has resistivity of
a. 10^{-2} ohm-cm * b. 10^{-8} ohm-cm
c. 10^{-4} ohm-cm d. 10^{-16} ohm-cm

97. Ionic bonds give ceramic materials relatively
a. High hardness b. High stability *
c. High Softness d. None of the above.

98. Most ceramic materials contain
a. Flakes b. Graphites
c. Silicates * d. All of the above.

99. Silicates find application as
a. Chemical ware
b. Electrical Insulators
c. Reinforcing glass fibres
d. All of the above *

100. Portland cement is a
a. Silicate * b. Hydrate
c. Both (a) & (b) d. Neither (a) nor (b)

101. ------------------ is the primary structural unit of silicates.
a. Silicon-Oxygen tetrahedron *
b. Chain structure
c. Framework structure
d. None of the above.

102. In silicon-oxygen tetrahedron structure one silicon atom fits interstitially among ------------------- oxygen atoms
a. Ten b. Twelve
c. Eight * d. Four

103. With ionic or covalent bonding mechanism each oxygen atom has only------------------ electrons rather than the eight available to its outer shell.
   a. Seventeen b. Five
   c. Seven * d. Four

104. Forsterite, a high temperature refractory contain -------------------- structure.
   a. Silicon-oxygen tetrahedron *
   b. Vitreous structure
   c. Double & Poly tetrahedral
   d. Sheet

105. The composition of the double tetrahedral unit is
   a. $Si\,O_4$ b. Si_3O_6
   c. Si_2O_7 * d. None of the above.

106. Pyrosilicates is an example of
   a. Vitreous structure
   b. Chain structure
   c. Sheet structure
   d. Double tetrahedral structure *

107. A polytetrahedral structure results when -------------- tetrahedral units link together.
   a. Two b. Two or more than two
   c. Three only d. Three or more *

108. The composition of polyhedral unit is
   a. Si_3O_9 * b. Si_4O_8
   c. SiO_4 d. Si_2O_7

109. Two corners of each tetrahedra when linked, form a
   a. Frame work structure
   b. Chain structure *
   c. Sheet structure
   d. None of the above.

110. In chain structure one of the oxygen is shared by ----------------- adjacent tetrahedra and similar sharing of oxygens takes place on the other corners of the tetrahedra.
   a. Six b. Four
   c. Two * d. One

111. Single chain structure can be noticed in
   a. Proxenes * b. Waxenes
   c. Both (a) & (b) d. Neither (a) nor (b)

112. A double chain structure results, when two parallel identical chains are ------------------ by sharing oxygen to every alternate tetrahedron.
   a. Collapsed b. Polymerized *
   c. Added d. Separated

113. Double chain structure is found in
   a. Amphiboles b. Proxenes *
   c. Both (a) & (b) d. Neither (a) nor (b)

114. These chain structures can be almost ------------------ in length.
   a. Limited b. A particular amount
   c. Infinite * d. All of the above.

115. A sheet structure results, when the -------------- extends infinitely in a two dimensional plane.
   a. Double chain structure *
   b. Single chain structure
   c. Poly-tetrahedral structure
   d. Double-tetrahedral structure.

116. Ceramic materials such as clays, micas and talc possess
   a. Tetrahedral structure
   b. Chain structure
   c. Sheet structure *
   d. None of the above.

117. An extension of silicate tetrahedral unit into three dimensions gives rise to a
   a. Framework structure *
   b. Sheet structure
   c. Tetrahedral structure
   d. None of the above.

118. The framework structure possesses
   a. Relatively low densities *
   b. Relatively high densities
   c. High atomic packing factors
   d. Softness

119. Frame work structure has
   a. High density
   b. High softness
   c. Low atomic packing factors *
   d. None of the above.

120. Framework structures are normally
   a. Hard * b. Soft
   c. High dense d. None of the above.

121. Quartz have
   a. Framework structure *
   b. Sheet structure
   c. Tetrahedral structure
   d. None of the above.

122. Cristobalite & Feldspar have
   a. Vitreous structure b. Chain structure
   c. Sheet structure d. Frame work structure *

123. Glass is a
   a. Vitreous silicate * b. Vitreous Aluminate
   c. Vitreous phosphate d. Vitreous Zincate

124. Glass possesses a
   a. Chain structure
   b. Double tetrahedral structure
   c. Vitreous structure *
   d. Framework structure

125. Glass is
a. Viscous *
b. Non viscous
c. Sheet structured material
d. None of the above.

126. Many elements exist in alternate crystalline forms depending upon the external conditions of temperature and pressure. This phenomenon is known as
a. Polymerization b. Polymorphism *
c. Allotropy d. None of the above.

127. ------------------ is the ability of a solid material to exist in more than one form or crystal structure.
a. Polymarisation b. Allotropy
c. Polymorphism * d. None of the above.

128. Between -273°C to 910°C iron has a
a. B.C.C.structure * b. F.C.C. structure
c. H.C.P.structure d. None of the above.

129. Above 910°C to 1400°C iron has--------------- structure.
a. H.C.P. b. F.C.C. *
c. B.C.C. d. None of the above.

130. Above 1400°C to 1539°C Iron again has
a. H.C.P. structure * b. F.C.C structure
c. B.C.C.structure d. None of the above.

131. Change of structure of iron from B.C.C to F.C.C & again from F.C.C. to B.C.C. in structure is reversible then the polymorphic change is known as
a. Polymorphism b. Polymarisation
c. Allotropy * d. None of the above.

132. Polymorphism is -------------------- alone to metallic elements only.
a. Restricted
b. Not restricted *
c. May be restricted, may not be
d. None of the above.

133. Silica may exists in ------------------ crystalline forms.
a. Five b. Seven
c. Three * d. Eight

134. Silicon tetrahedral units have hexagonal pattern upto
a. 870°C * b. 970°C
c. 1020°C d. 1078°C

135. Silicon tetrahedral units change to Cubic pattern above.
a. 425°C b. 770°C
c. 870°C * d. 539°C

136. Hardness of carborundum is
a. 1720 knoop b. 1800 knoop
c. 2700 knoop d. 2480 knoop *

137. Hardness of boron Nitride (Cubic) is
a. 5000 knoop b. 6000 knoop
c. 7000 knoop * d. 8000 knoop

138. Ceramic material have
a. Low tensile strength *
b. High tensile strength
c. Low compressive strength
d. None of the above.

139. Ceramic materials generally fail due to---------------- on cracks, pores etc.
a. High load b. Low load
c. Stress concentration * d. Impact

140. Tensile strength of Alumina is of the order of about ------------------ kg/cm^2.
a. 1900 * b. 2000
c. 2200 d. 2700

141. As compare to tensile strength, ceramic material possess ------------------ compressive strength.
a. Low b. Very low
c. Equal d. Much higher *

142. Compressive strength of alumina ranges from _________ kg/cm^2.
a. 19500 to 20500 * b. 19500 to 35000
c. 2000 to 4500 d. 13000 to 17000

143. Transverse strength of Alumina is
a. 3500 kg/cm^2 * b. 3700 kg/cm^2
c. 3950 kg/cm^2 d. 4100 kg/cm^2

144. Most of the ceramic possess
a. Low fracture strength *
b. High fracture strength
c. Failure with neck formation
d. None of the above.

145. Most of the ceramics fail
a. With neck formation b. In brittle manner *
c. In ductile manner d. None of the above.

146. The value of modulus of elasticity for ceramic materials ranges from
a. 7×10^{10} to 40×10^{10} N/m^2 *
b. 7×10^{9} to 40×10^{10} N/m^2
c. 7×10^{8} to 70×10^{8} N/m^2
d. 7×10^{4} to 40×10^{4} N/m^2

147. Ceramic materials find application as
a. Insulators b. Semi-conductors
c. Thermistors d. All of the above *

148. Dielectric strength is the electrical breakdown potential of an insulator per unit
a. Area b. Volume
c. Thickness * d. Length

149. Ferroxcube is a
    a. Non magnetic material
    b. Soft magnetic material *
    c. Hard magnetic material
    d. None of the above.

150. Ferroxdure is a ------------- material.
    a. Non magnetic b. Soft magnetic
    c. Hard magnetic * d. None of the above.

151. Ferrites possess
    a. Low resistivity
    b. High resistivity *
    c. No magnetic property
    d. No electrical property

152. High Alumina has dielectric strength of the order of
    a. 200-500 V/mil b. 150-700 V/mil
    c. 200-300 V/mil * d. None of the above

153. Oxidic ceramics are completely resistant to oxidation, even at very
    a. High pressures b. Low pressures
    c. Low temperatures d. High temperatures *

154. Glazed porcelain is used for
    a. Pressure vessels b. Chemical vessels *
    c. Both (a) & (b) d. Neither (a) nor (b)

155. Ceramic possesses good
    a. Thermal properties * b. Softness
    c. Ductility d. None of the above.

156. ------------------ enhances the strength of a glass by intensionally inducing compressive residual surface stresses.
    a. Glass tempering * b. Fibre forming
    c. Annealing d. None of the above.

157. The most common hydroplastic forming technique is
    a. Drawing b. Drifting
    c. Extrusion * d. None of the above.

158. In drying & firing, A body is usually fired at a temperature between
    a. 900 to 1400°C * b. 400 to 900°C
    c. 200 to 700°C d. 700 to 1040°C

159. During the firing operation, the density is further ------------------ and the mechanical strength is enhanced.
    a. Increased * b. Decreased
    c. Remain constant d. None of the above.

160. The degree of compaction is maximised by using ------------- in appropriate proportion.
    a. Fine grain particles only
    b. Coarse grain particles only
    c. Coarse & fine particles mixed *
    d. None of the above.

161. Function of the binder is to ------------ the powder particles as they move past one another in the compaction process.
    a. Oxidise b. Lubricate *
    c. Seperate d. Mix

162. In uniaxial pressing, the powder is compacted in a metal die by pressure that is applied in
    a. Single direction * b. Two different direction
    c. Both (a) & (b) d. Neither (a) nor (b)

163. In Uniaxial pressing, --------------- parts are produced
    a. Simple * b. Complex
    c. Very complicated d. None of the above.

164. In uniaxial pressing, production rates are
    a. Low b. High *
    c. Average d. None of the above.

165. In isostatic pressing, the powdered material is contained in a rubber envelope and the pressure is applied by a --------------------------- isostatically.
    a. Fluid * b. Ram
    c. Hammer d. None of the above.

166. For both uniaxial & isostatic procedures, a ------------ is required after the pressing operation.
    a. Firing operation * b. Quenching operation
    c. Subcooling operation d. None of the above.

167. Sintering is carried out
    a. At melting point temperature
    b. Above melting point temperature
    c. Below melting point temperature *
    d. None of the above.

168. In Hot pressing, the powder pressing and heat treatment are
    a. Performed separately
    b. Performed simultaneously *
    c. First heating then pressing
    d. None of the above.

169. Hot pressing is a ------------------ fabrication technique
    a. Cheap b. Moderate cost
    c. Expensive * d. None of the above.

170. In hot pressing ordinarily mold has a
    a. Longer lifetime b. Shorter lifetime *
    c. Average life time d. None of the above.

171. In injection moulding ------------------ parts are moulded.
    a. Thin * b. Thick
    c. Very short d. Very thick

172. General injection moulding should not be considered for parts whose thickness exceeds
    a. 6mm * b. 8mm
    c. 10mm d. 12mm

173. Glass fibres may have tensile strengths approaching
  a. 70000 kg/cm^2 * b. 90000 kg/cm$^{2.}$
  c. 27000 kg/cm$^{2.}$ d. 92000 kg/cm$^{2.}$

174. Usually ceramic materials are much stronger in
  a. Compression than in tension *
  b. Tension than in compression
  c. Heated state
  d. Quenched state

175. Slip can occur quite readily between, the crystal layers if the ----------------------- are appropriately aligned.
  a. Shear stress * b. Compressive stress
  c. Bending stress d. Tensile stress

176. Glass fibre is a __________ material.
  a. Ceramic * b. Organic
  c. Plastic -fibre d. None of the above.

177. Clay possesses ------------------
  a. High tensile strength b. High bending stress
  c. High shear strength * d None of the above.

■■■

CHAPTER - 44
REFRACTORIES AND REFRACTORY METALS

1. Refractories are ------------------ materials.
   a. Ceramic * b. Ferrous
   c. Non-ferrous d. None of the above.

2. Refractory materials are used in
   a. Rails b. Furnaces *
   c. Brake linings d. None of the above.

3. Refractories are --------------------- material.
   a. Heat resistant *
   b. Non heat resistant
   c. Very low cost material
   d. None of the above.

4. Refractories can withstand high temperatures without being fused.
   a. True statement * b. False statement

5. Refractories should possess --------------------- fusion temperature.
   a. High * b. Low
   c. Average d. None of the above.

6. Crucibles and furnace sides and bottoms containing molten metal are made up of
   a. Refractories * b. Ceramics
   c. Cermets d. Ferrous material

7. Refractories are used as ------------------ for powder metal into the mould.
   a. Moulds b. Cores
   c. Chaplets d. Ladles *

8. Refractories minimises
   a. Corrosion b. Thermal Blast
   c. Heat losses * d. None of the above.

9. The main constituents of foundry refractories are
   a. MgO, SiO_2, Al_2O_3 *
   b. MgO, Si_3O_9, Al_2So_4
   c. $MgO, Na(OH)_2, Al_2O_3$
   d. None of the above.

10. Refractories should be
    a. Corrosion resistant b. Abrasion resistant
    c. Heat resistant d. All of the above *

11. Refractory should possess
    a. Low thermal coefficient of expansion *
    b. High thermal coefficient of expansion
    c. Zero thermal coefficient of expansion
    d. None of the above.

12. Refractories should ------------------- chemical affinity with the molten metal they hold
    a. Have b. Not have *
    c. Have large d. None of the above.

13. Approx . Fusion temperature for silica is
    a. 1700°C * b. 1500°C
    c. 1300°C d. 1100°C

14. Approx. Fusion temperature for Aluminium silica is
    a. 2900°C b. 1500°C
    c. 1780°C * d. 2320°C

15. Aluminium Silica contain Al_2O_3 upto
    a. 49% b. 46% *
    c. 23% d. 56%

16. Aluminium silica contain SiO_2 upto
    a. 72% b. 49%
    c. 44% d. 54% *

17. Approx. Fusion temperature for Alumina is
    a. 1500°C b. 1750°C
    c. 2050°C * d. 1900°C

18. Silimanite is a combination of
    a. Si_3O_9 & Fe_2O_3 b. Al_2O_3 & SiO_2 *
    c. Al_2O_3 & SiO_4 d. None of the above.

19. Silimanite contain Al_2O_3 upto
    a. 53% b. 63% *
    c. 47% d. 72%

20. Silimanite contain SiO_2 upto
    a. 30% b. 32%
    c. 31% d. 37% *

21. Approx Fusion Temperature for silimanite is
    a. 2100°C b. 1900°C *
    c. 2250°C d. 2317°C

22. Silimanite is a ------------------ refractory
    a. Acid * b. Basic
    c. Neutral d. None of the above.

23. Approx. Fusion temperature for Magnesia is
    a. 2000°C b. 2100°C
    c. 2800°C * d. 1900°C

24. Bauxite is a ------------------ refractory.
    a. Acid b. Basic *
    c. Neutral d. None of the above.

25. Magnesia & dolomite are ------------------ refractory
a. Acid b. Basic *
c. Neutral d. None of the above.

26. Approx Fusion temperature of chromite is
a. 1700°C b. 2180°C *
c. 1900°C d. 2300°C

27. Approx. Fusion temperature of graphite is
a. 3000°C * b. 2500°C
c. 2000°C d. 2272°C

28. Chromite is a
a. Neutral refractory * b. Acid refractory
c. Basic refractory d. None of the above.

29. Graphite is a ------------------ refractory.
a. Acid b. Basic
c. Neutral * d. None of the above.

30. The prime ingrediant for acid refractories is
a. H_2SO_4 b. Sulphur
c. Chlorine d. Silica *

31. Acid refractories possess
a. Low temperature load bearing capacity
b. High temperature load bearing capacity *
c. High welding temperature (above 4000°C)
d. None of the above.

32. In refractories the alumina content should be held to a minimum, normally to between
a. 0.2 and 1.0 wt% * b. 0.6 and 2.0 wt%
c. 0.9 and 3.0% d. 2 and 3%

33. Basic refractories are rich in
a. Magnesia * b. Silica
c. Both (a) & (b) d. Alumina

34. Special refractories are relatively high-purity _________ material.
a. Oxide * b. Carbide
c. Hametile d. Ledburite

35. Refractories are obtained from ores of
a. Silica b. Alumina and silica
c. Both (a) & (b) * d. Neither (a) nor (b)

36. Refractory possesses
a. Extremely low melting point temp.
b. Average melting point temp.
c. Extremely high melting point temp. *
d. None of the above.

37. Tungsten have melting temperature ------------------ than molyledenum
a. More * b. Less
c. Equal d. None of the above.

38. Interatomic bonding of refractories are
a. Weak b. Little strong
c. Extremely strong * d. None of the above.

39. Fire clay brick is made of a non plastic
a. Ceramic material b. Cermets
c. Refractory material * d. None of the above.

40. Higher refractories can be attained by using pure oxides of _________ melting points.
a. High * b. Low
c. Average d. 200°C

41. Melting point of silicon, carbide is
a. 2100°C b. 2200°C
c. 2540°C * d. 2750°C

42. Melting point of Thoria is
a. 3000°C b. 3300°C *
c. 2100°C d. 1950°C

43. Thoria is a -------------------- material.
a. Refractory b. Super-refractory *
c. Ceramic d. Organic ceramic

44. Melting temperature of Beryllia is
a. 2100°C b. 2550°C *
c. 2000°C d. 2920°C

45. Beryllia is a ------------------ material.
a. Ferrous b. Non-ferrous
c. Ceramic d. Super refractory *

46. Specific gravity of thoria is
a. 9.69 * b. 2.34
c. 4.37 d. 6.24

47. Specific gravity of Beryllia is
a. 3.03 * b. 2.59
c. 1.22 d. 9.27

48. Specific gravity of Magnesia is
a. 3.58 * b. 4.58
c. 5.58 d. 6.58

49. Specific gravity of silicon carbide is
a. 4.17 b. 3.17 *
c. 2.17 d. 9.17

50. Specific gravity of silica is
a. 9.65 b. 7.65
c. 5.65 d. 2.65 *

51. Specific gravity of Alumina is
a. 4.97 b. 7.97
c. 3.97 * d. 6.97

52. Refractory metals and its alloy have high ------------ at room temperature.
a. Fluidity b. Castability
c. Tensile strength * d. None of the above.

53. Usually refractory considered for structural applications at above around
    a. 870°C * b. 970°C
    c. 1070°C d. 1170°C

54. Refractory metal possesses
    a. Bad corrosion resistance
    b. Good corrosion resistance *
    c. Low tensile strength at room temperature
    d. Both (a) & (c)

55. In most cases refractory oxidizes at elevated temperature that is why they must be protected with --------------- coatings.
    a. High temperature *
    b. Low temperature
    c. Plastic
    d. Non consumable metal

56. Molybdenum have modulus of elasticities at 1095°C --------------------------- steel at room temperature.
    a. More than b. Less than
    c. As high as * d. None of the above.

57. Refractory Metal possess ---------------- thermal shock resistance
    a. Poor b. Very poor
    c. Average d. Excellent *

58. Thermal conductivity of refractory metals are
    a. Low b. Average
    c. Less than any metal d. High *

59. Refractory metal possesses
    a. Low coefficient of expansion *
    b. High coefficient of expansion
    c. Zero coefficient of expansion
    d. None of the above.

60. Molybdenum retains good strength at temperatures above.
    a. 480°C * b. 900°C
    c. 1300°C d. 1222°C

61. Molybdenum is ideal for high temperature parts because
    a. It is subjected to hydrogen
    b. It is cheap
    c. It is not subjected to hydrogen embrittlement *
    d. None of the above.

62. Malleability and ductility of tungsten at room temperature is
    a. High b. Very high
    c. Low * d. Excellent

63. The forming operation of tungsten must be performed between
    a. 400 to 1650°C * b. 200 to 400°C
    c. 453 to 760°C d. 900 to 2700°C

64. Tungsten's oxidation resistance is
    a. Good b. Very good
    c. Excellent d. Poor *

65. Tungsten with upto about --------------- percent thorium oxide has long used for heliarc welding tips and for electron tube filaments, because of high emissivity
    a. 2 * b. 4
    c. 9 d. 17

66. Tantalum is the ------------------- abundant of the four principal refractory metals.
    a. Least *
    b. Most
    c. inter mediatly
    d. None of the above.

67. Tantalum is relatively
    a. Ductile *
    b. Brittle
    c. Difficult to work at room temperature.
    d. None of the above.

68 Tantalum has poor oxidation resistance in air above
    a. 560°C b. 260°C *
    c. 738°C d. 292°C

69. Tantalum is used for
    a. Acid resistant heat exchangers *
    b. Casting components
    c. Low temperature applications
    d. None of the above.

70. Columbium is also known as
    a. Tantalum b. Niobium *
    c. Calladium d. Wolfram

71. Columbium possesses
    a. High melting point & poor oxidation resistance
    b. Low vapour pressure & moderate density
    c. Excellent fabricability
    d. All of the above *

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CHAPTER - 45
METAL - JOINING PROCESSES

1. Which of the following is not used for structural joints
   a. welding
   b. copper-base alloy brazing
   c. soldering *
   d. none.

2. In general all gas welding, done to aircraft structure is
   a. oxy acetylene type *
   b. oxy hydrogen
   c. oxy nitrongen
   d. oxy sulphur.

3. For welding of aluminium alloy
   a. oxy acetylene is used
   b. oxy hydrogen is used *
   c. oxy gasolene is used
   d. all of above.

4. As compared to oxy hydrogen, oxy acetylene is
   a. much hotter * b. much cooler
   c. less hotter d. less cooler.

5. Carbonising/reducing flame is obtained when in oxy acetylene welding
   a. oxygen burns in excess
   b. acetylene is burned in excess *
   c. both equally burn
   d. none of the above

6. A feathery edge or white cone is the identification of
   a. neutral flame b. carburising flame *
   c. oxidizing flame d. both a. & c.

7. Excess burning of oxygen produces
   a. neutral flame b. carburizing flame
   c. oxidizing flame * d. both a. & b.

8. In oxyacetylene flame, a small pointed white cone and relatively short envelop of flame is identification of
   a. neutral flame b. carburizing flame
   c. reducing flame d. oxidizing flame. *

9. Which of the following results in a porous weld ?
   a. neutral flame b. Carbunising flame
   c. Reduction flame d. Oxidizing flame *

10. The general welding flame used in oxy acetylene welding is
    a. neutral flame b. carburizing flame *
    c. Oxidizing flame d. both b. & c.

11. A well-defined cone in the centre of the large flame in oxy hydrogen flame stands for
    a. neutral flame * b. reducing flame
    c. oxidizing flame d. carburising flame.

12. Which of the following is long and ragged and has no well defined cone at the centre ?
    a. neutral flame b. reducing flame *
    c. oxidizing flame d. none.

13. Which of the following is small and has very short cone at the tip of torch in case of oxyhydrogen welding ?
    a. neutral flame b. reducing flame
    c. carburising flame d. oxidizing flame *

14. Which of the following flame should be used to obtain clean and sound weld ?
    a. neutral flame * b. reducing flame
    c. carburising flame d. oxidizing flame.

15. Maximum carbon percentage content in low carbon welding welding rod is
    a. 0.06% * b. 0.07%
    c. 0.05% d. 0.04%.

16. Maximum manganese percentage content in low carbon rod is
    a. 0.22 % b. 0.25 % *
    c. 0.24 % d. 0.03 %

17. Which of following are electric resistance welding ?
    a. butt welding b. spot welding
    c. scan welding d. all of the above *

18. Which of the following welding is replaceable to oxyacetylene welding ?
    a. carbon arc welding *
    b. atomic hydrogen welding
    c. metallic arc welding
    d. inert arc welding

19. Dispensing with flux extremely used for preventions of corrosion, is belonging to
    a. carbon arc welding
    b. atomic arc welding
    c. metallic arc welding
    d. inert arc welding *

20. Both carbon and metallic electrodes are used in
    a. carbon arc welding b. atomic arc welding
    c. metallic arc welding d. inert arc welding *

21. In metal arc welding
    a. metal electrode is supplied with direct current
    b. two carbon electrodes are supplied with alternating current
    c. both a. & b. are correct *
    d. none of the above.

22. The heat generated in metallic welding is
a. 6000°F * b. 5000°F
c. 7000°F d. 8000°F.

23. The heat generated in carbon arc welding is
a. 6000°F b. 5000°F
c. 7000°F * d. 8000°F.

24. The heat generated in atomic hydrogen welding is
a. 6000°F b. 5000°F
c. 7000°F * d. 8000°F.

25. Which of the following process is particularly used for magnesium alloy ?
a. carbon arc welding
b. atomic hydrogen welding *
c. inert arc welding
d. multi arc welding

26. Which of the following is called heli arc ?
a. carbon arc welding
b. multi arc welding
c. inert arc welding *
d. atomic hydrogen welding

27. In which of the following five arc are generated ?
a. carbon arc welding
b. multi arc welding *
c. inert arc welding
d. atomic hydrogen welding

28. In electric arc welding when electric current applied after application of pressure it is called
a. upset butt welding *
b. downset butt welding
c. flash butt welding
d. none.

29. Where the edges are brought close enough together to start arcing and there after to reach fusion temperature, the welding technique is called
a. upset butt welding
b. downset butt welding
c. flash butt welding *
d. none.

30. Where power driven rollers are used as electrodes the welding technique is called
a. Butt welding b. spot welding
c. seam welding * d. none of the above.

31. Among the following welding, most frequently used for aircraft structure is
a. Butt welding b. spot welding *
c. seam welding d. none of the above.

32. Long sheets, bars and tubes are welded by :
a. Butt welding * b. spot welding
c. seam welding d. none of the above.

33. Which of the following welding technique are weaker in tension ?
a. Butt welding b. spot welding *
c. seam welding d. none of the above.

34. Which of the following arc welding use both direct current and indirect current ?
a. carbon arc welding
b. Atomic hydrogen welding
c. metallic arc welding
d. multi arc welding *

35. A continuous air tight weld can be obtained by which of following electric resistance welding ?
a. Butt welding b. spot welding
c. seam welding * d. none of the above.

36. Which of the following should be avoided during welding ?
a. straight tension welding
b. welding around tube
c. welds placed together
d. all of the above *

37. Which of the following is wrong for welding
a. welding should be made along with bend *
b. welding should not made both side of thin sheet
c. both above
d. none of the above.

38. In Brazing, the filler metal is
a. non-ferrous metal
b. melting point higher than 1000°F
c. an alloy
d. all of the above *

39. In Brazing, the melting point of filler material is
a. higher than that of the metal to be joined
b. lower than that of the metal to be joined *
c. same as that of the metal to be joined
d. none of the above.

40. Which of the following is called a hard soldering ?
a. Copper brazing b. Silver brazing *
c. aluminium brazing d. none of the above.

41. As usual, brazing stands for
a. Copper brazing * b. Silver brazing
c. aluminium brazing d. none of the above.

42. Which of the following is called as high temperature brazing ?
a. Aluminium brazing b. Copper brazing *
c. Silver brazing d. none of the above.

43. Which of the following is called as low temperature brazing ?
a. Aluminium brazing b. Copper brazing
c. Silver brazing * d. none of the above.

44. When temperature required is >1600°F which of the following is preferred ?
    a. Aluminium brazing b. Copper brazing *
    c. Silver brazing d. none of the above.

45. For temperature range of 1175 - 1600°F which of the following brazing is preferred
    a. aluminium brazing b. copper brazing
    c. silver brazing * d. none of the above.

46. Common soft soldering alloys are composed of
    a. tin and lead * b. tin & copper
    c. lead and aluminium d. tin & chromium

47. Tin & lead are in proportion of -------------------- in soft soldering alloy
    a. 1 : 2 b. 1 : 1 *
    c. 1 : 3 d. 2 : 1.

48. The tin + lead alloy melts at
    a. 421°F * b. 321°C
    c. 521°F d. none.

49. For soldering of steel, iron & copper, the soldering alloy contains tin and lead in proportion of
    a. 1 : 2 b. 2 : 1 *
    c. 1 : 1 d. 3 : 1.

50. For metal to metal joint by means of adhesive joints , the shear strength that is obtainable is
    a. 2000 psi b. 3000 psi *
    c. 4000 psi d. none.

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CHAPTER - 46
WELDING : INTRODUCTION AND TYPE OF JOINTS

1. A weld may be defined as a union between pieces of metals which have been made plastic by
   a. pressure b. heat
   c. either of above * d. none of the above

2. The welding processes generally used are classified into groups, i.e.
   a. forge welding
   b. pressure welding
   c. fusion welding (Without pressure)
   d. all above *

3. In forge welding, the metal is heated up
   a. until they are plastic
   b. and then joined by hammering
   c. and then joined by filling of molten metal
   d. and then as per a. and b.*

4. Fusion welding is done by
   a. oxy - acetylene gas b. electrical arc
   c. electrical resistance d. both a. and b.*

5. In fusion welding, the molten metal is added to form a pool joining and then allowed to solidify, this comprises
   a. melting b. casting
   c. both above * d. none of the above

6. Common joints employed in welding are
   a. close joint, open joint and edge joint
   b. but joint, angle joint and lap joint
   c. none of the above
   d. all as per a. and b. *

7. Close joint is
   a. where edge of each part is in the same plane and weld lies across *
   b. where surface joined are in contact while being welded
   c. a joint where the surfaces of joint overlap
   d. none of the above

8. Butt joint is
   a. where the edge overlap
   b. where edges are directly opposite *
   c. where edges form an angle
   d. where edges are spaced apart

9. Lap joint is
   a. where joints are in contact with edge to edge
   b. the joint over lap and in contact *
   c. edges are face to face opposite
   d. none of the above

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CHAPTER - 47
OXY - ACETYLENE WELDING

1. In oxy - acetylene welding gases used are
   a. oxygen and acetylene *
   b. hydrogen and acetylene
   c. nitrogen with acetone
   d. any of the above

2. The combustion of oxygen and acetylene produces the temperature of
   a. 5000 °C b. 4000 °C
   c. 4400 °C * d. none of the above

3. By adopting different techniques, oxy - acetylene welding method can join
   a. all ferrous metal only
   b. all non ferrous metal only
   c. all metals *
   d. only all types of light alloys

4. There are two systems in general use for oxy - acetylene welding, i.e.
   a. low pressure and high pressure *
   b. low temperature and high temperature
   c. low intensity and high intensity
   d. none of the above

5. The oxy - acetylene welding system consists of
   a. gas cylinders b. pressure regulator
   c. blow pipe d. all above *

6. To identify a oxygen cylinder, it can be seen that its base is
   a. flat b. convex *
   c. concave d. of any type of above

7. For cutting the metal by oxy - acetylene welding method is performed by
   a. independent stream of acetylene
   b. independent stream of oxygen *
   c. either of the above
   d. none of the above

8. In oxy - acetylene welding process, the other important equipment includes
   a. cutting guides and gas economiser
   b. goggles and gloves
   c. welding gun and shut off valve
   d. as per a. and b. *

9. For successful welding correct type of flame is must, hence, the types of flames used in gas welding are
   a. carburising, neutral and oxidising flame *
   b. conical, sharp with enveloped flame
   c. with blue cone with yellow envelope
   d. of all above

10. The correct type of flux is used to prevent oxidation and chemical reactions therefore flux choosen must perform
    a. to dissolve oxides
    b. to provide protective coating to prevent oxidation
    c. to float the oxides and impurities to the surface of molten metal
    d. all above *

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CHAPTER - 48
GAS WELDING FAULTS

1. The failure to fill the metal through out the depth of the weld is known as
   a. under cutting b. craters
   c. lack of penetration * d. none of the above

2. When the added metal adheres, without fusion to the sides of weld is
   a. oxide trapping b. adhesion *
   c. oxidation d. any of the above

3. Due to lack of sufficient heat, the usual fault occurs is
   a. adhesion b. oxide trapping *
   c. carburising d. none of the above

4. Burning is caused by
   a. the oxidation of the boundries of metal crystals
   b. use of too small a blow pipe
   c. either of the above
   d. both of the above *

5. Excessive supply of oxygen to blow pipe causes
   a. oxidation * b. oxide trapping
   c. over heating d. channelling

6. Carburising is confided to welds of ferrous metals and is caused by
   a. excess supply of oxygen
   b excess supply of acetylene *
   c. too large a blow pipe d. too small a blow pipe

7. The under cutting or valleying can occur
   a. by holding flame too high when making the fillet weld
   b. by adding insufficient metal from welding rod
   c. due to application of flame to a butt weld for long
   d. by all above causes *

8. Over heating is usually caused
   a. by using too large a blow
   b. by the accumulation of heat due to excessive welding
   c. by either of the above *
   d. by none of the above

9. If insufficient metal is used in the joint then
   a. channelling will form along the line of weld *
   b. crators will form
   c. valleying will form
   d. any of the above will form

10. The conical depressions formed in the molten metal are known as
    a. channelling b. valleying
    c. crators * d. none of the above

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CHAPTER - 49
ELECTRIC ARC WELDING, ARGON ARC WELDING AND RESISTANCE WELDING

1. In electrical arc welding the procedure is
   a. to make contact between electrode and work
   b. keep electrode away about 1/16" to 1/8"
   c. melt the metal and electrode
   d. all above *

2. The electric arc welding can be performed by
   a. DC supply
   b. AC supply
   c. 25 to as high as 800 amps
   d. all above *

3. The advantages of electrical arc welding are
   a. localised heating, economical
   b. with no explosion, good for site welding
   c. good for structural and heavy welding
   d. all above *

4. In argon arc welding
   a. the tungsten electrode is used
   b. a separate filler wire is fed
   c. tungsten rod get fused and act as filler
   d. a. and b. are correct *

5. Through out the argon arc welding process, the argon gas
   a. guards electrode, arc and weld from atmosphere
   b. prevents formation of nitrides in molten metal
   c. provide both above *
   d. provides nothing above

6. For argon arc welding, the argon gas is supplied with
   a. Pressure 120 atmosphere
   b. 160 cu ft volume cylinder
   c. pressure 80 atmosphere
   d. a. and b. *

7. The advantages of argon arc weldings are
   a. no flux no corrosion
   b. localised heating with minimum distortion
   c. compact and high quality weld
   d. all above *

8. The principle of resistance welding is
   a. that of blacksmith welding
   b. as a. but heat is obtained by electrical energy
   c. to generate heat from passing the heavy current at low voltage to metal
   d. as per b. and c. *

9. In resistance welding, when the joining metals are brought to plastic stage then
   a. it is join by hammering
   b. joined by mechanical pressure *
   c. joined by metal spraying
   d. it is joined by arcing the edges

10. The process of resistance welding is quite good for mass production and under this process various methods are adopted, i.e.
   a. Spot and shim welding
   b. Butt welding and flash butt welding
   c. all of above *
   d. of course, not all above

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CHAPTER - 50
SOLDERING

1. Soft soldering is carried principally where the strength of the joint is of no importance, it is carried by soft solder as melting alloy, which is combination of :
   a. lead and zinc   b. lead and tin *
   c. copper and tin   d. copper and zinc

2. Brazing is used for strong joints for
   a. brass   b. bronze
   c. steel   d. all above *

3. Hard soldering is the alternative to brazing and the filler material is
   a. hard solder   b. brass
   c. silver   d. both as b. and c. *

4. Silver solder is
   a. purely silver   b. silver is added in brass*
   c. one of the above   d. both of the above

5. Flux used for soft soldering varies according to metal but for hard soldering it is
   a. chloride flux *   b. protective flux
   c. borax   d. none of the above

6. The equipment required for soldering is
   a. soldering iron, solder and flux
   b. brazing lamp
   c. source of heat
   d. as per a. and c.*

7. The sweat soldering can be performed by
   a. covering the joint with solder paint
   b. applying soldering heat in a separate operation with sufficient temperature
   c. doing above in sequence
   d. placing the solder and flux on joint and apply heat with pressure *

8. Dip soldering is performed by dipping the part (such as radiators) are dipped into molten solder bath, the portion not to be soldered is
   a. protected by removable shield
   b. coated with lime wash
   c. given grease coating
   d. either of a. or b. *

9. For soft soldering first the soldering iron is tinned and face of the bit cleaned and then
   a. heat the body, apply flux to bit
   b. rub the tip on solder for smooth coating
   c. apply flux and heat the joints and apply solder
   d. all above is done in sequence *

10. A good soft soldering needs
    a. minimum amount of solder
    b. iron to be tinned always for flow
    c. proper heating to avoid oxidation
    d. all above *

11. Faulty solder joints are caused by
    a. greasy or corroded surfaces
    b. wrong type of flux and solder
    c. improper heating of iron
    d. all above *

12. In sufficient heat will cause in soft soldering
    a. sluggish flow of solder
    b. incomplete penetration of solder
    c. faulty joint
    d. all above *

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CHAPTER - 51
SOLDERING IRONS, SOLDERS AND FLUXES

1. The common soldering iron of various sizes and shape are heated by
   a. DC power b. AC power
   c. Brazing lamp * d. Any of the above

2. The advantages of electric iron are
   a. that it seldom require tinning
   b. available in various sizes, shapes and voltage
   c. the provision of temperature control
   d. all above *

3. Alumino - thermic iron is heated by
   a. brazing lamp b. dc power
   c. ac power d. burning 'Mox" tablet *

4. Alumino thermic iron copper bit have a circular cavity where is 'Mox' tablet is placed which is
   a. the magnesium and aluminium oxide
   b. ignited by the special match termed as fusee
   c. not to be ignited near the aircraft
   d. all as above *

5. Soft solders are mainly alloy of tin and lead, but to give a harder and stronger joint, small % of
   a. brass is added b. silver is added
   c. antimony is added * d. nothing is added

6. For fine and general work the solder for soft soldering used is
   a. tinmans * b. electricians
   c. lead silver d. any of the above

7. The flux are used for soldering to
   a. protect from oxidation
   b. dissolve metallic oxides, if formed
   c. reduce surface tension of molten jointing alloy
   d. perform all above *

8. The active fluxes are corrosive are made in form as
   a. paste b. salt
   c. fluid d. all above *

9. Protective fluxes are used where complete freedom required from
   a. acid action b. corrosive action
   c. both of above * d. none of the above

10. Flux non - corrosive is used for
   a. all general soldering
   b. affixing identification lables to steel tubings *
   c. steel conductors
   d. all above

11. Flux soldering 'Jayadatene' is an active flux and is used for
   a. general purpose
   b. tinning large surfaces
   c. stainless steel ignition cables only *
   d. none of the above

12. 'Ortho phosphoric Acid' flux is used for
   a. ignition cables b. general purpose
   c. stainless steel pipes * d. none of the above

13. Salammoniac flux is a active flux and is used for
   a. tinning large surfaces * b. general purpose
   c. all metals d. stainless steel pipes

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CHAPTER - 52
BRAZING AND SILVER SOLDERING

1. Brazing is a d.ifferent type of weld.ing in which
   a. Brazing metal have low melting temperature then the metals to be brazed.
   b. metal to be brazed. are melted. and. filled. with brazing material
   c. metals are joined. by flowing a filler material between the joining ed.ges
   d. happens as per a. and. c. *

2. Silver sold.ering is used. for fine work and. where the joints need.ed. stronger then soft sold.ering, where at the same time it is heated. to
   a. brazing temperatures
   b. lesser then brazing temperature *
   c. higher then brazing temperatures
   b. any of the above temperature

3. The range of silver sold.er melting temperature is
   a. 600 - 780 °C *　　b. 850 - 900 °C
   c. 100 - 150 °C　　d. none of the above

4. Increase of zinc contents in brazing spelter, with copper
   a. increases the melting point
   b. decreases the melting point *
   c. have no effect on melting point
   d. neutralised. by copper sulphates

5. In silver brazing alloy, the silver is an essential constituent but accompanied. with one or more metal like
   a. copper　　b. zinc
   c. cad.mium　　d. any or all of the above*

6. For general aircraft work and. electric work, the silver sold.er of melting range from 700 °C to 775 °C is used., which contains
   a. silver 42 - 44 %, copper 6 - 38%, zinc 18.5 - 20.5 % and. impurities 0.5 % *
   b. silver 49 - 51 %, copper 14 - 16 %, zinc 15 - 17 % cad.mium 18 - 20 % and. impurities 0.5%
   c. either of the above combination
   d. neither of the above combination

7. There are two main types of fluxes used. for brazing these are
   a. Borax, for temperatures above 750 °C
   b. Fluorid.e, for temperature below 750 °C
   c. Fluorid.e, for temperatures below 600 °C
   d. As stated. in a. and. b. *

8. Before brazing the parts should. be cleaned.
   a. mechanically　　b. chemically
   c. either as desired.*　　d. by both above

9. For brazing, apply flux to the metal to be brazed., the brazing rod. is to be protected. by warming it up and. application of flux then
   a. apply heat by brazing lamp to batter heat cond.uctor metal, if d.issimilar metals are
   b. apply heat by brazing lamp to thicker metal if same metal of d.issimilar thickness are
   c. melt the brazing alloy, by applying end. of the brazing rod. to heated. edges of joint
   d. all above is d.one in sequence *

10. Which statement is true
   a. brazing is attracted. by hottest part of metal
   b. heating is done ahead. of brazing alloy to facilitate the brazing
   c. continue feed the brazing alloy till joint is filled.
   d. all above statements are true *

11. After brazing traces of flux must be removed. by
   a. rubbing with wire brush in water for fluorid.e flux
   b. diluted. sulphuric acid., followed. by water rinse for borax type
   c. hot water rinsing
   d. any desired method stated in a. and. b.*

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CHAPTER - 53
BRAZING LAMPS

1. Brazing lamps operated by kerosene and consists of
   a. hand pump with NRV
   b. pressure gauge with safety valve
   c. burner with flame regulator
   d. all above *

2. In brazing lamp the kerosene flows from the tank through
   a. vaporiser to jet *
   b. jet to vaporiser
   c. from burner chamber to jet
   d. none of the above

3. The brazing lamp operates at pressure
   a. 10 -15 lbs psi b. 20 - 30 lbs psi *
   c. 5 - 10 lbs psi d. none of the above

4. The available brazing lamps are of capacity
   a. 2 pint and 5 pints *
   b. one pint and seven pints
   c. one pint and five pints
   d. five pints and ten pints

5. To vaporise kerosene in brazing lamp, the vaporising tube is heated, before light up of lamp, by burning in primary well, the
   a. small amount of kerosene
   b. benzene
   c. mathylated spirits *
   d. none of the above

6. If vaporiser of brazing lamp is hot enough, it will light up and
   a. eject kerosene out
   b. give yellow flame
   c. give blue flame *
   d. nothing above will happen

7. If vaporiser of brazing lamp is not hot enough, the
   a. lamp will give yellow flame
   b. lamp will eject kerosene out
   c. either of above may happen *
   d. none of the above will happen

8. In case the vaporiser of lamp is not sufficiently hot and eject kerosene or give yellow flame, then:
   a. continue operation, gradually it will give correct flame
   b. release air and repeat the light up process *
   c. either of above may be opted
   d. none of the above is permitted

9. If during use, the flame of the lamp suddenly becomes small, it indicate that
   a. kerosene is running out
   b. jet is blocked *
   c. vaporiser is malfunctioning
   d. any of the above may happen

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CHAPTER - 54
IDENTIFICATION OF METALS & ALLOYS

1. Mild steel (black) has a ------------------- with blue/black sheen.
   a. Smooth Scale * b. Rough Scale
   c. Fibrous scale d. None of the above.

2. Mild steel (bright) has smooth, scale free, with ---------
   a. Silver grey surface *
   b. Silver colour surface only.
   c. Grey surface only.
   d. Black sheen

3. Medium carbon steel has smooth scale, with ------------
   a. White sheen b. Black sheen *
   c. Grey sheen d. None of the above.

4. High carbon steel possesses-------------- and is black
   a. Smooth scale b. Rougher scale *
   c. Fibrous scale d. None of the above.

5. High speed steel has rougher scaleof
   a. Black sheen
   b. Black with reddish tint *
   c. Black with greenish tint
   d. Black with bluish tint

6. Copper has a
   a. Reddish colour
   b. Grey-white combination of colour
   c. Distinctive-brownish red colour *
   d. None of the above.

7. Aluminium is a --------------------- metal.
   a. Red silver b. Yellowish
   c. Silver white * d. None of the above.

8. ------------------- is the separation of a body under stress into two or more parts.
   a. Fracture * b. Segregation
   c. Departing d. None of the above.

9. Fracture results in the creation of new
   a. Surfaces * b. Products
   c. Parts d. All of the above.

10. When brittle Material such as grey cast iron fractures, there is no
    a. Cracks occur b. Neck formation *
    c. Separation d. None of the above.

11. Neck formation occurs in
    a. Brittle Material b. Ductile Material *
    c. Both (a) & (b. d. Neither (a) nor (b.

12. Density of Iron is ------------------- gm/cm³
    a. 7.87 * b. 8.87
    c. 9.87 d. 10.87

13. Density of Grey cast iron is -------------- gm/cm³
    a. 7.15 * b. 8.15
    c. 9.15 d. 10.15

14. Density of Nodular cast iron is ------------------- gm/cm³
    a. 6.12 b. 7.12 *
    c. 8.12 d. 9.12

15. Density of low carbon steel is ------------------- gm/cm³.
    a. 5.86 b. 6.86
    c. 7.86 * d. 8.86

16. Density of medium carbon steel is ------------- gm/cm³
    a. 4.85. b. 6.86
    c. 9.86 d. 7.85 *

17. Density of high carbon steel is ------------------ gm/cm³
    a. 4.84 b. 7.84 *
    c. 9.84 d. 13.24

18. Density of Austenitic stainless steel is --------- gm/cm³
    a. 8.00 * b. 8.23
    c. 8.43 d. 9.00

19. Density of Aluminium is --------------------- gm/cm³
    a. 2.71 * b. 3.71
    c. 1.72 d. 3.74

20. Density of copper is ------------- gm/cm³
    a. 8.94 * b. 5.23
    c. 3.21 d. 4.21

21. Density of mg is ------------------- gm/cm³
    a. 1.74 * b. 2.74
    c. 3.74 d. 4.74

22. Density of silver is ------------------- gm/cm³
    a. 10.49 * b. 9.49
    c. 8.49 d. 5.23

23. Density of Nickel is ------------------- gm/cm³
    a. 8.90 * b. 5.23
    c 6.53 d. 7.42

24. During ringing (sound. test, cast steel gives
    a. Bright sound * b. Dull sound
    c. Mix sound d. None of the above.

25. During ringing (sound. test, grey cast iron gives
    a. Bright sound b. Dull sound *
    c. Both (a) & (b. d. Neither (a) nor (b.

26. The filing test on work piece gives result on the basis of
    a. Heat generated between work piece & file
    b. Speed of file
    c. Chip removal rate *
    d. Friction between work piece & file.

27. Ductile & Non ductile materials are separated by
    a. Sound test b. Filing
    c. Deep Drawing * d. None of the above.

28. When cold hammered, Mild steel (Bright)
    a. Flattened easily*
    b. is fairly difficult to flatten
    c. Can not be flattened
    d. None of the above.

29. When cold hammered, medium carbon steel
    a. Flattens easily
    b. is fairly difficult to flatten *
    c. is very difficult to flatten
    d. None of the above.

30. When cold hammered, cast Iron
    a. Flattens easily
    b. Very difficult to flatten
    c. Crumbles under hammering *
    d. None of the above.

31. Forgeability test is a
    a. Sound test b. Filing test
    c. Hammering test * d. Magnetic test

32. Mild steel when turns, it gives
    a. Smooth, curly ribbon -like chips *
    b. Smooth & plane chips
    c. Long ribbon like chips
    d. None of the above.

33. Cast Iron when turned, it gives
    a. Granular chips grey in colour *
    b. Curly-ribbon chips, grey in colour
    c. Long curly ribbon chips
    d. None of the above.

34. Copper when turned, it gives
    a. Plane chips with BUE
    b. Discontinuous small chips like powder
    c. Ribbon like chips with razor edge *
    d. None of the above.

35. Fork gives spark in spark test like
    a. Dashes and appendages
    b. Stream
    c. Bud break arrow *
    d. None of the above.

36. Under spark test shaft gives spark like a
    a. Stream *
    b. Bud break arrow
    c. Dashes and appendages
    d. None of the above.

37. During spark test springs give spark like
    a. Stream
    b. Bud break arrow
    c. Dashes and appendages *
    d. None of the above.

38. Under spark test plain carbon steels give spark like
    a. Stream with yellow stars
    b. Yellow forked rays with white stars at the end *
    c. White forked rays type
    d. None of the above.

39. Pure iron will show only forked rays with a
    a. Yellow colour * b. White colour
    c. Grey colour d. Red colour

40. When iron is alloyed with tungsten, the spark will be
    a. Bright yellow * b. Bright white
    c. Bright red d. None of the above.

41. If steel is alloyed to Nickel, the spark will range according to the alloy content, from an intensive.
    a. White to orange * b. Yellow to red
    c. Orange to red d. None of the above.

42. The initial rays coming off white cast iron will have a ---------------------- that slowly turns to a straw yellow.
    a. Red stream * b. Yellow stream
    c. White stream d. Bright yellow stream

43. Medium carbon steel gives out yellow sparking which is ------------- than mild steel.
    a. Shorter * b. Longer
    c. Brighter d. None of the above.

44. High carbon steels spark is ------------------- bright.
    a. Less * b. Good
    c. Excellent d. Are not

45. During Flame Test, -------------melts fast becomes bright red before melting.
    a. Low carbon steels * b. Nodular Iron
    c. White Iron d. None of the above.

46. During Fracture test, low carbon steel looks
    a. Bright green b. Bright grey *
    c. Blackish d. None of the above.

47. By appearance low carbon steel look like
    a. Dark grey * b. Bright grey
    c. Light black d. None of the above.

48. Low Carbon steels are
    a. Non Magnetic b. Poorly magnetic
    c. Strongly Magnetic * d. None of the above.

49. Die steel gives --------------- spark than tool steel.
    a. Shorter * b. Longer
    c. Equal d. None of the above.

50. During spark test Gray Cast Iron gives average stream length of ------------------- mm with power grinder.
    a. 25 * b. 50
    c. 27 d. 35.

51. Various grades of metals in the same metallic group are not designated by name but are identified by
    a. Markings
    b. Standard colour code
    c. Practical test
    d. Either of the above *

52. Gray cast iron will throw a spark, when held against grinding wheel, of :
    a. Light cherry red
    b. Dull red with bursting
    c. Dull red with non bursting *
    d. Red with non bursting

53. The wrought iron when held against grinding wheel, the type of spark is of
    a. Dull red
    b. Bright yellow
    c. Bright yellow non bursting *
    d. Red

54. The wrought iron when dropped on anvil, will give :
    a. Low pitch ring * b. Medium pitch ring
    c. High pitch ring d. Very high pitch ring

55. Mild steel when dropped on anvil, it will produce
    a. Low pitch ring b. Medium pitch ring *
    c. High pitch ring d. Very high pitch ring

56. Mild steel when held against grinding wheel, the type of spark is produced of
    a. bright yellow non bursting
    b. bright yellow, few carbon bursts *
    c. bright yellow all bursting
    d. red non bursting

57. High carbon steel when dropped on anvil, produces
    a. No ring b. High pitch ring
    c. Medium pitch ring d. Very high pitch ring *

58. HCS when held against grinding wheel, produces type of spark :
    a. Light cherry red
    b. Dull red
    c. Bright yellow non bursting
    d. Bright yellow all bursting *

59. Tungsten steel when dropped on anvil, it produces
    a. Very high pitch ring * b. No ring
    c. Low pitch ring d. None of the above

60. Tungsten steel when held against grinding wheel, the spark produced it
    a. Dull red, bursting
    b. Red, non bursting (follow the wheel) *
    c. Very bright yellow
    d. Bright yellow with all bursting

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CHAPTER - 55
HEAT TREATMENT OF STEELS

1. Metallography deals with
   a. internal structure of metals
   b. principles underlying changes in structure
   c. movement of electrons
   d. both a. & b. *

2. Terms which describe the heat treatments normally used are
   a. annealing b. normalising
   c. hardening d. drawing
   e. all the above *

3. Special heat treatment processes are called
   a. carburizing b. cyaniding
   c. nitriding d. all the above *

4. While the materials possess the property, that permits them to exist in various forms without a change in chemical composition is said to be
   a. isotropic b. isotronic
   c. allotropic * d. isoton

5. Common allotropic substances are
   a. diamond b. graphite
   c. charcoal d. all the above *

6. Pure iron exists in
   a. alpha state b. beta state
   c. gamma state d. all of these *

7. Alpha iron state is stable within the temperature limits
   a. 1400^0 F * b. 100^0 F
   c. 1000^0 F d. 1500^0 F

8. Beta iron state is stable within the temperature limits
   a. 1400^0 F to 1652^0 F * b. 1400^0 F to 1500^0 F
   c. 1450^0 F to 1550^0 F d. 1500^0 F to 1600^0 F

9. Gamma iron state is stable within the temperature range
   a. above 1652^0 F * b. above 1550^0 F
   c. above 1450^0 F d. above 1400^0 F

10. At which temperature the molten metals stops cooling momentarily during solidifaction
    a. 1400^0 F b. 1440^0 F
    c. 1652^0 F * d. 1700^0 F

11. Ar_3 is called
    a. lower critical point b. upper critical point *
    c. critical point d. none

12. While cooling continues during solidification of molten iron a second retardation occurs at
    a. 1400^0 F * b. 1500^0 F
    c. 1600^0 F d. 1440^0 F

13. Second, retardation during solidification of molten iron causes
    a. transformation of beta into alpha iron *
    b. transformation of alpha into beta iron
    c. transformation of gamma into beta iron
    d. any of the above

14. Ar_2 is called
    a. second critical point *b. first critical point
    c. upper critical point d. lower critical point

15. The point Ac_2 is
    a. 20^0 F higher than Ar_2 *b. 20^0 F higher than Ar_3
    c. 20^0 F lower than Ar_2 d. 20^0 F lower than Ar_3

16. The point Ac_3 is
    a. 20^0 F higer than Ar_3 b. 20^0 F higher than Ar_2 *
    c. 20^0 F higher than Ar_4 d. 20^0 F higher than Ar_5

17. The iron carbide is
    a. Fe_3C b. Fe_2C *
    c. FeC_3 d. Fe_4C

18. Steel with less than 0.85% carbon is called,
    a. eutectoid b. hypo-eutectoid *
    c. super eutectoid d. none

19. Steel with more than 0.85% carbon is called
    a. eutectoid b. hypo-eutectoid
    c. hyper-eutectoid * d. none

20. Upper critical point occurs at
    a. 0.85% carbon content *
    b. 0.75% carbon content
    c. 0.95% carbon content
    d. 0.65% carbon content

21. Steels with ferrite are __________.
    a. hypo-eutectoid * b. hyper-eutectoid
    c. eutectoid d. none

22. Number of critical points depend upon
    a. hydrogen content b. oxygen content
    c. carbon content * d. all the above

23. Scope of the critical range depend upon
    a. hydrogen content b. oxygen content
    c. carbon content * d. all the above

24. The number of critical points upto a little over 0.4% carbon
    a. one b. two
    c. three * d. four

25. The 13% manganese steel has a critical range
    a. below atmospheric temperature *
    b. above atmospheric temperature
    c. at atmospheric temperature
    d. none of the above

26. The internal structure of steel, is almost wholly depend upon the exact relationship of
    a. iron and hydrogen b. iron and carbon *
    c. iron and oxygen d. none of the above

27. The carbon is in chemical combination with the iron as iron carbide is called
    a. cementite * b. ferrite
    c. pearlite d. all the above

28. A mechanical mixture of six parts of ferrite to one part of cementite is known as
    a. megamite b. pearlite *
    c. cementite d. none of these

29. Steels composed of pearlite and excess ferrite are used as
    a. aircraft steel * b. tool steel
    c. domestic steel d. none of these

30. Pearlite is a mechanical mixture of six parts of ferrite to
    a. one part of cementite *
    b. two parts of cementite
    c. three parts of cementite
    d. four parts of cementite

31. Steels composed of pearlite and excess cementite are used as
    a. aircraft steel b. tool steel *
    c. domestic steel d. all the above

32. Eutectic alloy is that alloy of two substances which has the
    a. highest fusing point b. lowest fusing point *
    c. moderate fusing point d. none of these

33. Steel with 0.85% carbon content is known as
    a. eutectoid * b. hypo-eutectoid
    c. hyper-eutectoid d. none of these

34. Steel with less than 0.85% carbon called
    a. eutectoid b. hypo-eutectoid *
    c. hyper-eutectoid d. none of these

35. Steel with more than 0.85% carbon called
    a. eutectoid b. hypo-eutectoid
    c. hyper-eutectoid * d. none of these

36. Steel with excess ferrite are
    a. eutectoid b. hypo-eutectoid *
    c. hyper-eutectoid d. none of these

37. Steel with excess cementite are
    a. eutectoid b. hypo-eutectoid
    c. hyper-eutectoid * d. none of these

38. If steel is cooled very slowly through the critical range the result is
    a. laminated ferrite b. laminated cementite
    c. laminated pearlite * d. none of these

39. Pearlite is relatively
    a. soft, brittle
    b. strong, brittle
    c. strong, hard & ductile *
    d. all the above

40. The tensile strength of pearlite is
    a. less than 50,000 Psi b. less than 90,000 Psi
    c. over 100,000 Psi * d. none of these

41. Greatest hardness from heat treatment is obtained by steel containing
    a. 0.5% carbon b. 0.65% carbon
    c. 0.85% carbon * d. 0.95% carbon

42. When molten steel solidifies
    a. austenite is formed * b. pearlite is formed
    c. none of above d. both are formed

43. Transition from austenite to pearlite can be arrested by
    a. dropping austenite steel just above critical range in cold water or oil *
    b. dropping austenite steel just below critical range in cold water or oil
    c. dropping austenite steel just to the critical range in cold water or oil
    d. none of the above

44. Heating steel to just above the critical range and then rapidly cooling is
    a. hardening * b. softening
    c. tempering d. none of above

45. Reheating of hardened steel to a temperature below critical range is
    a. drawing b. tempering
    c. both a & b * d. none of above

46. Intermediate form of cementite in alpha iron obtained when transition from austenite to pearlite is arrested
    a. it is martensite * b. it is drawing
    c. both a & b d. none of above

47. Martensite is present in drawn as tempered steel
    a. true b. false *

48. __________ is present in drawn as tempered steel
a. troostite * b. martensite
c. sorbite d. none of above

49. ___________ is third intermediate form between austenite to pearlite
a. sorbite * b. troostite
c. martensite d. none of above

50. Hardened steel consists almost entirely of
a. martensite, sorbite b. martensite, troostite *
c. both a & b d. none of above

51. Heating through ___________ is absolutely necessary to obtained best refinement of the grain.
a. critical range * b. below critical range
c. above critical range d. none of above

52. Fine-grain structure is obtained just above the critical range only on __________.
a. rising heat * b. lowering heat
c. none of above d. both a & b

53. To establish critical range and heat treatment it is necessary to know ___________.
a. chemical contents * b. physical contents
c. both a. & b. d. none of the above

54. Annealing consists in heating below Ac_1, in the region, between
a. 1020^0 & 1200^0 F * b. 1000^0 & 1200^0 F
c. 900^0 & 1200^0 F d. none of above

55. __________ applied to high carbon steel to improve machinability.
a. spherodizing * b. annealing
c. both d. none

56. Shop annealing is the term used to describe the practice of heating steel with a welded torch to __________.
a. 900^0 to 1000^0 F * b. 1000^0 to 1100^0 F
c. both d. none

57. Normalizing is a form of __________.
a. annealing * b. hardening
c. both d. none

58. Normalizing is a form of annealing which consist of heating the steel above
a. Ac_1 b. Ac_2
c. Ac_3 * d. none

59. To obtain material of uniform physical characteristics __________ is done.
a. normalizing * b. tempering
c. both d. none

60. Medium & high carbon steel should be normalized and then annealed before
a. machining b. fabrication
c. both a. and b. * d. none of above

61. Ultimate strength of chrome-molybdenum sheet should be
a. 110,000 to 125,000 Psi *
b. 110,000 to 125,000 Pascal
c. 125,000 to 150,000 Psi
d. 125,000 to 150,000 Pascal

62. Medium and high carbon steel should first be _________ and then machined
a. normalized, annealed *
b. annealed , normalized
c. annealed
d. none

63. Normalizing and then annealing before machining of medium and high carbon steel is called
a. annealing b. double annealing *
c. triple annealing d. none

64. In aircraft, the amount of machining work is
a. small * b. omitted
c. more d. none

65. In aircraft work annealing is
a. small b. omitted *
c. more d. none

66. The alloy of chromium cannot be satisfactorily hardened without
a. normalizing * b. hardening
c. machining d. none

67. The hardest form of the steel
a. martensite * b. troostite
c. both a. and b. d. none

68. After quenching process the surface of the metal becomes
a. brittle b. hard
c. martensite d. all of these *

69. The second operation required to develop the high-strength is
a. tempering * b. normalizing
c. both a. and b. d. none

70. Ultimate strength of tensile steel is
a. 125,000 to 200,000 P.S.I *
b. 125,000 to 200,000 pascal
c. 150,000 to 200,000 P.S.I
d. none

71. Hardened steel is compound of
a. troosite b. sorbite
c. both * d. none

72. The temperature within which the material can be soaked is
a. 50 to 75^0 F * b. 75 to 100^0 F
c. 75 to 120^0 F d. none

73. For steel and sizes normally used in a/c construction a soaking period is
 a. 30 to 45 min. * b. 45 min. to 1 hr.
 c. 10 to 20 min. d. none

74. For annealing the heated steel must be furnace cooled to
 a. 1000^0 F b. 900^0 F *
 c. 800^0 F d. none

75. Medium carbon steel should be quenched into
 a. brine or water * b. oil
 c. both d. none

76. Oil quenching is preferred to water cooling because it gives to metal sufficient
 a. strength b. hardness *
 c. both d. none

77. When the structure of material, changes, from austenite to martensite the volume is
 a. remain same b. increased *
 c. decreased d. none

78. Strength values, normally quoted, are based on heat-treatment section
 a. 1 to 1½ inches in dia. *
 b. as in (a) but upto 3 inches
 c. as in (b) but in length
 d. none

79. The alloy hardens quite uniformly throughout when treated and quenched is called
 a. penetration hardened *
 b. low hardened
 c. both
 d. none

80. The ultimate strength of chrome vanadium steel (springs) is
 a. 200,000 Psi * b. 210,000 Psi
 c. 190,000 Psi d. none of the above

81. Rockwell hardness number for chrome vanadium steel is
 a. C-42 to C-47 * b. C-47 to C-50
 c. C-50 to C-80 d. none

82. Chrome vanadium steel should be heat treated at
 a. 1100^0 F * b. 1200^0 F
 c. 1300^0 F d. none

83. The chrome vanadium steel should be quenched into
 a. oil * b. water or brine
 c. either a. or b. d. none

84. The ultimate strength of chrome-molybdenum steel is
 a. 78,000 Psi * b. 78,000 pascal
 c. either a. or b. d. none

85. The hardness number of chrome-molybdenum steel is
 a. B-89 to B-99 * b. B-99 to B-100
 c. B-70 to B-89 d. none

86. The normalizing of chrome-molybdenum steel should be carried out between
 a. $1600\text{-}1700^0$ F * b. $1600\text{-}1650^0$ F
 c. $1600\text{-}1690^0$ F d. none

87. The hardening temperature of molybdenum steel is
 a. $1525\text{-}1575^0$ F * b. $1575\text{-}1600^0$ F
 c. both a. and b. d. none

88. The molybdenum steel should be quenched into
 a. oil b. water or brine *
 c. both d. none

89. The molybdenum steel should be cooled in
 a. furnace b. water
 c. still air * d. none

90. The heat treatment of chrome-nickel steel is done at
 a. 1100^0 F * b. 1200^0 F
 c. 1300^0 F d. none

91. The brinell hardness number of nickel steel is
 a. 500 * b. over 500
 c. below 500 d. none

92. The ultimate strength of the chrome-nickel steel is
 a. 125000 to 180000 Psi *
 b. 125000 to 185000 Psi
 c. 125000 to 190000 Psi
 d. none

93. The tempering temperature of chrome-nickel steel is
 a. 1050^0 F
 b. 950^0 F
 c. 800^0 F
 d. according to above and vary with U.T.S. *

94. Rockwell number of chrome-nickel steel with the U.T.S of 125000 Psi is
 a. C-25 to C-32 * b. C-33 to C-37
 c. C-38 to C-42 d. none

95. Brinell number of chrome nickel steel with the U.T.S of 125000 Psi is
 a. 250 to 300 * b. 310 to 360
 c. 360 to 400 d. none

96. Rockwell number of chrome nickel steel with the U.T.S of 150000 Psi is
 a. C-33 to C-37 * b. C-37 to C-38
 c. C-38 to C-42 d. none

97. The brinell number of chrome nickel steel with U.T.S of 100,000 Psi is
 a. 310 to 360 * b. 360 to 400
 c. either d. none

98. The rockwell no. of the chrome-nickel steel with U.T.S of 180,000 Psi is
    a. C-38 to C-42 *
    b. C-42 to C-80
    c. C-80 to C-84
    d. none

99. The brinell number of chrome-nickel steel with U.T.S. of 180,000 Psi is
    a. 360 to 400 *
    b. 400 to 400
    c. 310 to 360
    d. none

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CHAPTER - 56
ELEMENTTARY HEAT TREATMENT OF CARBON STEELS

1. When steel is heated, the internal structure changes and
   a. affects its properties
   b. affects no change in properties
   c. these changes occurs in reverse while cooling
   d. Happens as a. and c. *

2. By using the correct heat treatment, the medium carbon steel can be made
   a. Soft b. Hard
   c. Brittle d. Any of the above *

3. The maximum degree of hardness and toughness can not be obtained together, because
   a. maximum hardness promotes brittleness
   b. maximum toughness reduces hardness
   c. in view of a. and b. compromise is to be made
   d. all above *

4. The pure iron is called as
   a. Cementite b. Ferrite *
   c. Pearlite d. Haematite

5. Chemical compound of carbon in iron termed iron carbide is known as
   a. Cementite * b. Ferrite
   c. Pearlite d. Haematite

6. As the carbon contents is increased upto 0.87%, the steel becomes wholly
   a. Haematite b. Pearlite *
   c. Cementite d. Ferrite

7. When steel is heated and temperature rises steadily, at certain point, the temperature rise is momentarily checked for a short interval. The temperature at which it occurs is known as
   a. Critical point b. Arrest point
   c. Either of above * d. None of the above

8. It is known that lower critical point of all carbon steels are the same (730 ^{o}C. at this point Pearlite:
   a. Such as disappears
   b. Charges to laminae of ferrite and cementite
   c. Forms the solid solution known as austenite
   d. Changes as per a., b. and c.*

9. As 0.87 % carbon steel consists of only pearlite and have only one critical point (730^{o}C.. Steels containing lesser or higher carbon are heated further to bring into solid solution up to
   a. Melting temperature
   b. Just above lower critical point
   c. Upper critical point * d. None of the above

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CHAPTER - 57
HARDENING PROCESSES AND CHANGE OF PROPERTIES

1. When carbon steel is heated a little above its upper critical point and then cooled by drastic quenching, then the austenite is changed into
   a. the martensite * b. troostite
   c. sorbite d. none of the above

2. The hardening treatment gives the steel
   a. Small grain size
   b. Maximum hardness and tensile strength
   c. Minimum ductility
   d. All above *

3. When carbon steel is heated above its critical point and the rate of cooling is not much drastic, the austenite is changed into troosite which is
   a. hard and brittle
   b. less hard and tough *
   c. strong and ductile
   d. maximum hard and maximum tough

4. When carbon steel is heated above upper critical point and allowed to cool slowly will produce
   a. troosite
   b. martensite
   c. sorbite *
   d. none of the above

5. If a hardened steel is heated, the martensite is stable only at below 200^{o}C. With increasing temperature, it is modified :
   a. first into sorbite
   b. first into troosite and then into sorbite *
   c. austenite
   d. none of the above

6. The hardened carbon steel is brittle, to make it tough, it is to be re - heated to
   a. above upper critical point
   b. tempering temperature below the above critical point
   c. tempering temperature is judged by temper colours
   d. as mentioned in b. and c. *

7. A hardened and tempered steel can be restored to its softest state by annealing i.e.
   a. heating below the critical point and quenching in oil
   b. heating above the upper critical point and leaving it in hot asses *
   c. heat up to lower critical point and quenching in water
   d. none of the above

8. Normalising is done to work hardened steel by heating upto
   a. below critical points
   b. annealing temperatures and cool in air *
   c. upper critical point
   d. either of the above

9. Since prolong heating above upper critical point coarsen the grain structure of metal. To restore the structure to crystalline, the process adopted is
   a. Tempering b. Annealing
   c. Normalising d. Refining *

10. Refining is done by heating the metal between 840 - 900^{o}C two or three times by reducing temperature every next process and cooled by
    a. Quenching in water or oil *
    b. Air
    c. Hot ashes
    d. Any of the above

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CHAPTER - 58
PRACTICAL HEAT TREATMENT OF STEELS (TEMPERATURE & APPROXIMATE COLOUR CODE)

1. Success of any heat treatment is determined by the
   a. way it is heated
   b. temperature it is heated
   c. media it is heated
   d. all above *

2. The clean methods of heating are
   a. muffle furnaces
   b. ovens heated by oil, gas or electricity
   c. salt baths heated by oil or gas
   d. all above *

3. In furnace, ovens and baths, the temperature is measured by
   a. thermo couples
   b. thermo electric pyrometers *
   c. either of the above
   d. none of the above

4. The thermo electrical pyrometer embodies the thermocouple principle i.e.
   a. two dissimilar metal strips are joined
   b. the joint is heated
   c. by heating two dissimilar metal joint, electrical pressure is generated
   d. all above *

5. The electric current generated by thermo electric pyrometer is fed to
   a. voltameter
   b. milli-voltmeter *
   c. ammeter
   d. none of the above

6. When open fire method is employed, the temperature of the work is judged by
   a. colour of fire flame
   b. colour of the oxide film on the surface of work *
   c. either of the above
   d. none of the above

7. If a high speed tungsten steel is heated to the white colour, the temperature is considered to be with in
   a. 1400 - 1500 ^oC
   b. 1300 - 1400 ^oC
   c. 1200 - 1300 ^oC *
   d. None of the above

8. High chromium steel when heated to orange colour, it corresponds the temperature between
   a. 700 - 800 ^oC
   b. 800 - 900 ^oC
   c. 900 - 1000 ^oC *
   d. 600 - 700 ^oC

9. When springs are heated to tempering temperature at approximately 300^oC, the oxide colour on metal surface will be of appearance
   a. Brown
   b. Purple brown
   c. Blue *
   d. Pale yellow

10. The golden yellow oxide colours are for the tempering of
    a. Chisels, hacksaw frames
    b. Taps, dies and punches
    c. Axes, screw drivers
    d. Drills, milling cutters

■■■

CHAPTER - 59
QUENCHING, HARDENING AND TEMPERING TEMPERATURES

1. The usual quenching media, in the order of rapidity of effect are :
   a. Water, brine, oil and air
   b. Brine, water, oil and air *
   c. Air, brine, water and oil
   d. Oil, brine, water and air

2. If work is to be partially quenched, then it is needed
   a. to hold job at one position
   b. to move the job up and down *
   c. first dip the job fully, then dip partially
   d. none of the above

3. If the shape of the job is irregular then dip the
   a. smaller portion first
   b. larger portion first *
   c. job as much as possible
   d. job by any of the above way

4. For hardening the steel with carbon contents of 0.4% to 0.87% to be heated uniform to a temperature of about
   a. 30°C above upper critical point *
   b. 30°C below upper critical point
   c. 60°C above lower critical point
   d. None of the above

5. For steels containing the carbon contents over 0.87% are to be hardened by heating to a temperature
   a. Slightly above the lower critical point *
   b. above the upper critical point
   c. Slightly below the lower critical point
   d. below the upper critical point

6. If tempering temperature is high, the metal will be
   a. more hard
   b. lesser hard *
   c. greater tough
   d. as per b. and c.

7. For hand tool such as chisels, centre punches one heat method is used for making, hardening and tempering i.e.
   a. heat the metal to light cherry red and forge to shape
   b. normalize and when cold grind roughly to shape
   c. heat it to cherry red on its half length towards cutting edge and quench
   d. all above *

8. The tempering colour for chisel is
   a. brown
   b. straw
   c. purple brown *
   d. none of the above

9. For the steels containing carbon contents upto 0.87%, the annealing temperature should be
   a. below the upper critical point
   b. above the upper critical point *
   c. below the lower critical point
   d. above the lower critical point

10. The steels containing carbon contents above 0.87% are heated for annealing to the temperature
    a. below the upper critical point *
    b. above the upper critical point
    c. below the lower critical point
    d. above the lower critical point

■■■

CHAPTER - 60
CASE HARDENING

1. The object of case hardening is to give
   a. to give low carbon steel a high carbon content on the surface *
   b. additional carbon to the core of metal
   c. hardening to the surface of high carbon steel
   d. none of the above

2. In open hearth process of case hardening the item is heated to light cherry red colour dipped into carburising compound, three to four times. The hardness obtained so is approximately
   a. 0.005" * b. 0.008"
   c. 0.10" d. 0.040"

3. When an item is case hardened by open hearth process, then
   a. annealing is required
   b. refining is required
   c. either of above is required
   d. none of the above required *

4. When case hardening the number of parts by box process the box is heated to carburising temperature of
   a. » 900 °C * b. » 700 °C
   c. » 1000 °C d. » 840 °C

5. If carburising by box process is done for four hours, the thickness of hardness obtained is
   a. » 0.030" b. » 0.040" *
   c. 0.005" d. None of the above

6. After carburising through box process the item is subjecting to refining by heating to temperatures between
   a. 700 - 760°C b. 840 - 900 °C *
   c. 900 - 1000 °C d. None of the above

7. After carburising by box process for case hardening, finally it is to be hardened by heating to
   a. upper critical point and quench in water
   b. 760 °C temperature and quench immediately in oil
   c. 760°C and allow it to cool to 700 °C then quench in water or oil *
   d. None of the above

8. In cyanide process, the job is immersed in molten sodium cyanide (920 °C.. It provides
   a. Necessary heat
   b. Carbonising material
   c. Hardness upto 0.010"
   d. All above *

9. The nitriding process of case hardening produces a very hard surface on special alloy steels by
   a. Heating item in a box to 500 °C
   b. Providing steady stream of ammonia gas
   c. Heating from 10 to 90 hours
   d. All above *

10. The depth of hardened case is obtained from the nitriding process, with no necessity to quench, is:
    a. 0.005" to 0.10" b. 0.008" to 0.010"
    c. 0.006" to 0.030" * d. None of the above.

11. For design purposes
    a. surface should be hard
    b. wear resisting surface is required
    c. strong and tough core
    d. all the above is required *

12. Which process give a uniform condition either extremely hard and strong or moderately hard and tough
    a. heat treatment * b. annealing
    c. nitriding d. anodizing

13. Which of the following are commonly used surface hardening process.
    a. carburizing b. cyaniding
    c. nitriding d. all the above *

14. Which of the following is not a surface hardening process
    a. carburizing b. cyaniding
    c. anodizing * d. nitriding

15. The combination of carburizing and the subsequent heat treatment is called ___________.
    a. case hardening * b. carburizing
    c. annealing d. nitriding

16. For aircraft, which of the following is mostly used
    a. case hardening * b. annealing
    c. nitriding d. anodizing

17. Carburizing steels may be either carbon or alloy steels but must be within the ___________ carbon range
    a. high b. low *
    c. medium d. none

18. The carburizing process consists of heating these steels in contact with a __________ materials.
    a. carbonaceous material *
    b. non-carbonaceous material
    c. ferrous material
    d. non-ferrous material

19. Carbonaceous material may be
    a. solid b. liquid
    c. gaseous d. any of the above *

20. Above critical range the iron carbide in steel posses into solution, the form of __________.
    a. alpha iron b. beta iron
    c. gamma iron * d. any of above

21. ___________ steels are weak solution
    a. low carbon * b. high carbon
    c. medium d. any of above

22. Which solution absorbs free carbon
    a. low carbon steel * b. high carbon steel
    c. medium carbon steel d. none

23. The carbon-rich carbonaceous materials when heated gives off a ___________ containing carbon.
    a. liquid b. solid
    c. liquidus d. gas *

24. The depth of carbon penetration depends upon the __________.
    a. carl material
    b. carbonaceous material *
    c. nitriding materials
    d. none

25. The depth of carbon penetration depends upon the
    a. temperature * b. heat
    c. velocity d. acceleration

26. The depth of carbon penetration depends upon the
    a. heat b. time allowed *
    c. velocity d. none

27. The absorption of carbon at the surface will greatly increase the ___________ in the region.
    a. carbon contents b. Ag content
    c. iron content d. Al content

28. At the surface of the steel the carbon contents are __________.
    a. 0.8 to 1.25% * b. 2.5 to 3.25%
    c. 2.1 to 2.7% d. 1.9 to 2.3%

29. Heat treatment will ___________.
    a. harden the core b. toughen the core
    c. both a. & b. * d. none

30. Greater hardness could be obtained from
    a. low carbon steels b. high carbon steels *
    c. medium carbon steels d. none

31. Most commonly used method of carburizing is with a ___________ carbonaceous material
    a. solid * b. liquid
    c. gaseous d. liquidus

32. Which of the following are the carbonaceous material?
    a. bone b. charred leather
    c. wood charcoal d. all the above *

33. The furnace for carburizing should be brought upto________.
    a. 1500 to 1600^0 F b. 1600 to 1700^0 F *
    c. 1440 to 1550^0 F d. 1550 to 1650^0 F

34. Range of some carburizing steels are
    a. 1500 to 1600^0 F b. 1400 to 1500^0 F
    c. 1600 to 1650^0 F * d. none

35. Rapid penetration can be obtained at
    a. low temperature b. higher temperature *
    c. medium temperature d. none

36. The grain growth will increase rapidly and affect the quality of steel at
    a. higher temperature * b. lower temperature
    c. medium temperature d. none

37. To avoid grain growth temperature should be kept as close as
    a. critical range * b. higher critical range
    c. lower critical range d. none

38. In aircraft work, case depth should be of
    a. $\frac{1}{64}$ inch b. $\frac{1}{65}$ inch
    c. $\frac{1}{32}$ inch d. a. and c. *

39. For avoiding the warpage __________ is employed
    a. slower rate of cooling *
    b. fast rate of cooling
    c. does not depend on the cooling
    d. none

40. Which of the following, completes the carburizing process
    a. heating b. cooling *
    c. case hardening d. none

41. After completion of carburizing the parts are ready for
    a. grain refinement b. hardening
    c. tempering d. all above processes *

42. Liquid carburizing method is applicable to small parts where a depth of case is not greater than __________ is satisfactory.
    a. 0.4 inch b. 0.04 inch *
    c. 0.25 inch d. 4 inch

43. Advantages of liquid carburizing are/is
    a. to form a case uniform in depth and carbon contents*
    b. to form a case hardening
    c. any of the above
    d. none

44. Which of the following process is faster
    a. liquid carburizing * b. solid carburizing
    c. any of the above d. none

45. Carburizing temperature is well above the __________.
 a. critical range * b. lower critical range
 c. upper critical range d. none

46. In order to obtain fine ductile grain in the core, it is necessary to reheat the steel to just above the ___________.
 a. critical point b. upper critical point *
 c. lower critical point d. none

47. For SAE 1020 steel hardening procedure, the furnace is preheated to
 a. 1000^0 F * b. 1500^0 F
 c. 950^0 F d. 1200^0 F

48. For SAE 1020 steel temperature of the furnace after the parts are inserted should be raised from 1000^0F to
 a. 1440 to 1500^0 F b. 1400 to 1430^0 F *
 c. 1500 to 1550^0 F d. 1600 to 1650^0 F

49. For SAE 1020 steel hardening the parts are quenched in
 a. air b. oil *
 c. water d. sulphur

50. Carburized steel parts are tempered by heating in the region of
 a. 200^0 F to 300^0 F b. 200^0 C to 300^0 C
 c. 300^0 F to 400^0 F * d. 300^0 C to 400^0 C.

51. Which of the following is done earlier
 a. hardening * b. tempering
 c. either a. or b. d. none

52. The furnace or oil bath should be at the ___________ when the parts are inserted.
 a. tempering temperature *
 b. critical temperature
 c. upper critical temperature
 d. lower critical temperature

53. When extreme hardness is desired
 a. the low part of the tempering range should be used*
 b. the high part of the hardening range should be used
 c. the high part of the tempering range should be used
 d. none

54. Hardness will decrease when
 a. tempering temperature increases *
 b. tempering temperature decreases
 c. tempering temperature remain same
 d. none

55. Warpage of carburized parts is caused by
 a. improper packing or severe quenching *
 b. proper packing
 c. any of the above
 d. none

56. Cracking of part occurs in the ___________.
 a. hardening quench * b. case hardening
 c. annealing d. anodizing

57. Carburizing steels are
 a. plain carbon or alloy steels
 b. low carbon steels
 c. both a. & b. *
 d. none

58. For carburizing carbon contents are restricted to a maximum of
 a. 0.35% b. 0.25% *
 c. 0.45% d. 5.3%

59. For light parts requiring extremely tough cores _________ carbon is maximum.
 a. 0.15% b. 0.18% *
 c. 0.20% d. 0.19%

60. For heavy parts requiring strong cores the carbon content of the steel should be ___________.
 a. 0.15% to 0.25% * b. 0.18% to 0.23%
 c. 0.25% to 0.35% d. 0.18% to 0.29%

61. Selection case hardening is
 a. fast b. faster
 c. slow * d. medium

62. Selective case hardening process is
 a. economical b. expensive *
 c. moderate d. none

63. Before upper plating, the sections are japanned to
 a. protect them from being plated *
 b. isolate them
 c. save them
 d. none

64. Selective case hardening is done
 a. every where
 b. in some where
 c. to harden only that portion of the part subject to severe wear *
 d. none

65. Good dense copper plate will resist the penetration of carbon, having thickness of copper plates of
 a. few hundredths of an inch
 b. few thousandths of an inch *
 c. one milimeter
 d. one centimeter

66. The finishing of hardened carburized parts is done by ___________.
 a. galvanizing b. annealing
 c. nitriding d. grinding *

67. When soft sections are desired
    a. sufficient material is left on the original machining*
    b. used material is left on the original machining
    c. either a. or b.
    d. none

68. While machining after carburizing leave ________ of stock on the section to be threaded
    a. $\frac{1}{4}$ th inch * b. $\frac{1}{8}$ th inch
    c. $\frac{1}{5}$ th inch d. $\frac{1}{10}$ th inch

69. Commonly used alloys steels are
    a. nickel b. nickel-chromium
    c. molybdenum d. all the above *

70. Alloying elements __________ the hardness of the case
    a. increase b. decreases *
    c. rises d. none

71. Alloys decrease the __________ of the case
    a. hardness b. softness
    c. viscosity d. elasticity

72. Which of the following, decreases the case hardness?
    a. increase in nickel content *
    b. decrease in nickel content
    c. any of above
    d. none

73. Which of the following steel, has the softest case of the carburizing ?
    a. SAE 2515 * b. SAE 2320
    c. SAE 2330 d. SAE 3250

74. Core strength of which steel is highest ?
    a. SAE 1020 b. SAE 2320
    c. SAE 2515 * d. SAE 3115

75. Core strength of which of the steel is minimum ?
    a. SAE 1020 * b. SAE 2320
    c. SAE 2515 d. SAE 3115

76. Core strength of which of the steel is maximum ?
    a. SAE 3115 b. SAE 3312 *
    c. SAE 6115 d. SAE 2320

77. Core strength of SAE 1020 is
    a. 60,000 Psi * b. 75,000 Psi
    c. 55,000 Psi d. 65,000 Psi

78. Core strength of SAE 2320 is
    a. 60,000 Psi b. 80,000 Psi *
    c. 85,000 Psi d. 90,000 Psi

79. Core strength of SAE 2515 is
    a. 120,000 - 160,000 Psi * b. 100,000 Psi
    c. 90,000 - 100,000 Psi d. 80,000 to 90,000 Psi

80. Core strength of SAE 3115 is
    a. 85,000 * b. 90,000
    c. 75,000 d. 65,000

81. Core strength of SAE 3312 is
    a. 90,000 b. 100,000 *
    c. 85,000 d. 120,000

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CHAPTER - 61
SHAPING OF METAL

1. Sectional dimension of ingot is
   a. 6 x 6 inches * b. 12 x 12 inches
   c. 18 x 18 inches d. 24 x 24 inches

2. Sectional dimension of a billet is
   a. approximately square
   b. less than 6 x 6 inches
   c. both a. and b. are correct *
   d. none of these

3. Slabs have
   a. rectangular section
   b. width is greater than twice the thickness
   c. the thickness is lesser than half of the width
   d. all *

4. Hot working is done by
   a. rolling b. forging
   c. both a. and b. * d. none of these

5. In hot rolling billets are heated
   a. above the critical range *
   b. below the critical range
   c. above the super - critical range
   d. below the super - critical range

6. The rolling should end just above the critical range in order to obtain
   a. the finest grain - size *
   b. the course grain - size
   c. the fine grain - size
   d. none of the above

7. In the operation of rolling mills,
   a. there is a strong temptation of excess heating
   b. to keep the metal is kept ext remely hot *
   c. metal is kept in plastic form
   d. all *

8. Coarse grains lacks in
   a. the cohesion of fine grains
   b. the strength of metal
   c. both a. and b. are correct *
   d. none of the above

9. In hot rolling, the scale may be removed
   a. by pickling * b. by cyaniding
   c. by case hardening d. by carburizing

10. Steel shapes to be rolled are heated to approximately
    a. 2300^{o}F b. 2300 ^{o}C *
    c. 2900 ^{o}C d. 3300 ^{o}C

11. Hot - rolled material is frequently finished by
    a. cold rolling b. drawing
    c. both a. and b. d. none of the above

12. In forging
    a. metal is refined
    b. metal is made more dense
    c. metal is more homogeneous
    d. all of the above *

13. Finishing of steel forging is done in order to
    a. prevent grain growth b. prevent distortion
    c. prevent corrosion d. both a. and b. *

14. Forging is done
    a. by pressing b. hammering
    c. both a. and b. * d. none of the above

15. If the force applied in forging has been insufficient to penetrate to the centre, the finished forging surface will be
    a. concave * b. convex *
    c. flat d. none of the above

16. The advantage of hammering is that
    a. the operator has control over the amount of pressure applied
    b. the operator has control over the finishing temperature
    c. the operator is able to produce metal of the highest grade
    d. all of the above *

17. Smith forging is extensively used when
    a. a small number of parts are required *
    b. a large number of parts are required
    c. a small part is required
    d. none of the above

18. Upsetting is a forging operation in which a hot piece of metal is
    a. increased in thickness
    b. decreased in length
    c. increased in thickness and decreased in length *
    d. increased in thickness and length

19. With the upset head
    a. the grain is perpendicular to the force
    b. the grain will resist shearing forces
    c. the grain will resist tensile forces
    d. both a. and b. *

20. Swaging is used for shaping
a. bar b. rod
c. tube d. all *

21. In drop forging, the surplus metal which has been squeezed out into the relieved section is called
a. fin b. flash
c. fin or flash * d. none of the above

22. In laying out forging dies, it is necessary to slope the inside faces from
a. 7^o to 15^o * b. 15^o to 22^o
c. 22^o to 29^o d. 29^o to 36^o

23. In drop forging, the sloping of the sides is referred to as
a. draft * b. fin
c. flash d. all of the above

24. For aircraft forging, commonly used steels are
a. chrome - molybdenum
b. chrome - nickel - molybdenum
c. nickel - molybdenum
d. both a. and b. *

25. The maximum tensile strength of a powdered - metal pressing may be as high as
a. 50% of the tensile strength of the solid materials
b. 60% of the tensile strength of the solid materials
c. 70% of the tensile strength of the solid materials
d. 80% of the tensile strength of the solid materials*

26. Cold - worked material
a. increases in strength
b. increases in plastic limit and hardness
c. loses ductility
d. all of the above *

27. Cold worked material
a. increases in brittleness
b. loses in ductility
c. both a. and b. *
d. all of the above

28. In cold working, material
a. has good surface finish
b. is more compact
c. has accurate dimensions
d. all of the above *

29. To relieve the internal strain setup in cold - worked material is done
a. annealing
b. annealing or normalizing *
c. tempering
d. none of the above

30. Wire is manufactured from hot - rolled steel
a. of 1/8 to 3/4 inch in diameter *
b. of 1 to 2 inch in diameter
c. of 2 to 3 inch in diameter
d. of 3 to 4 inch in diameter

31. In cold drawing
a. the force necessary is approximately 50% of the breaking strength of the wire *
b. the force necessary is approximately 70 % of the breaking strength of the wire
c. the force necessary is approximately 80% of the breaking strength of the wire
d. none of the above

32. Music wire is drawn to small diameters with a tensile strength of
a. 300 PSI b. 3000 PSI
c. 30000 PSI d. 300000 PSI *

33. All aircraft tubing is finished to size by
a. cold drawing * b. cold rolling
c. drop forging d. hot rolling

34. In general, forgings have
a. better impact strength
b. better impact strength and fatigue resistance
c. better impact strength and toughness
d. better impact strength, fatigue resistance and toughness *

35. Steel castings have been used for
a. tail - wheel forks
b. landing - gear axles
c. landing gear yokes
d. all of the above *

36. Steel castings shrinks by
a. 1 inch per foot
b. 1/2 inch per foot
c. 1/3 inch per foot
d. 1/4 inch per foot *

37. The riser,
a. allow the escape of air
b. provides a place for loose sand and impurities to float clear
c. provides a reservoir of hot metal
d. all of the above *

38. cracks and small holes are repaired in casting by
a. plugging b. balding
c. both a. and b. * d. none of the above

39. True centrifugal casting process is used for manufacturing of
a. air - cooled cylinder barrels
b. tubular sections
c. landing - gear parts
d. all of the above *

40. Chrome - molybdenum S. A. E. 4140 steel has
a. tensile strength of 140000 to 150000 PSI *
b. yield strength of 125 PSI
c. elongation of 50 percent
d. impact strength of 100 ft - lb

41. Precision casting is also known as
    a. lost wax casting *
    b. centrifuge casting
    c. semi centrifugal casting
    d. true centrifugal casting

42. High - alloy steels and stainless steels can be cast by
    a. precision casting * b. centrifuge casting
    c. static casting d. none of these

43. Most common cause of blow holes is
    a. carbon monoxide *
    b. oxygen
    c. nitrogen
    d. watt

44. Segregation is the concentration of many of the chemical compounds found in steel
    a. at the centre of the ingot *
    b. at the face of the ingot
    c. at the side of the ingot
    d. all of the above

45. Fins and laps defects caused by rolling is due to
    a. improper rolling *
    b. small blow holes
    c. failure of the metal to weld together
    d. all of the above

46. Scratches in cold - drawn seamless tube are due to
    a. rough dies
    b. rough mandrels
    c. insufficient lubrication
    d. all of the above *

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CHAPTER - 62
CORROSION AND ITS PREVENTION

1. The metal that is destroyed by electrolytic corrosion is called
   a. anodic b. corroded end
   c. cathodic d. both a. & b. *

2. Enamel is
   a. pigment b. varnish
   c. mix of a. & b. * d. none of the above.

3. The inside of battery boxes and materials in the vicinity of battery boxes are painted with
   a. Bituminous paint
   b. Acid-resistant paint *
   c. soya-bean-oil component
   d. marine glue

4. An asphalt varnish, resistant to mineral acid is used for
   a. acid resistant paint *
   b. marine glue
   c. soya-bean-oil compound
   d. bituminous paint.

5. The unexposed parts are painted with
   a. acid resistant paint
   b. marine glue
   c. soya-bean-oil compound
   d. bituminous paint *

6. Metal hulls and floats to make water tight are plated by means of
   a. acid-resistant paint
   b. bituminous paint
   c. soya-bean oil compound
   d. marine glue *

7. Which of the following is used for rust-preventive compound
   a. Bees wax and Grease *
   b. Par - at - ketone
   c. Marine glue
   d. Acid resistant paint.

8. Which of the following is used for sealing compound on either wood or metal hulls for water tightness
   a. Soya-bean-oil compound
   b. Rust-preventive compound
   c. Marine glue *
   d. Bee's wax, grease.

9. Zinc plating is called as
   a. galvanizing * b. sherardizing
   c. Parkerizing d. all of the above.

10. Which of the following is done in the atmosphere of zinc oxide ?
    a. galvanizing b. sherardizing *
    c. Parkerizing d. none .

11. Heating of parts, treated in a bath of diluted iron phosphate is known as
    a. sherardizing b. parkerizing *
    c. galvanizing d. none.

12. Molten zinc maintained at a temperature of 800°-925°F for
    a. galvanizing * b. sherardizing
    c. Parkerizing d. all.

13. If it is needed that surface of steel parts to be converted to a non-metallic oil absorptive phosphate coating, then the plating operation used is
    a. granodizing b. cosletzing
    c. parco lubrizing * d. galvanizing.

14. Modification of which of the following plating operation is used for reduction of wear on moving parts ?
    a. galvanizing b. granadizing
    c. cosletting d. parco lubrizing *

15. Which of the following plating process with solution of iron filing and phosphoric acid is used ?
    a. galvanizing b. granading
    c. cosletizing * d. parco lubrizing.

16. Which of the following is the surface application of molten metal on any solid base material ?
    a. galvanizing b. granading
    c. metal spraying * d. parco lubrizing.

17. In accessible parts of aircraft are painted by
    a. Marine glue b. Bee's wax and grease
    c. acid resistant d. par-at ketone. *

18. Which of the following do not require any treatment?
    a. Copper b. Brass
    c. Bronze d. All. *

19. Which of the following is a nitro cellulose ?
    a. varnish b. lacquer *
    c. enamel d. all.

20. Resins immersed in an oil or mineral spirits, forms
    a. Lacquer b. varnish *
    c. enamel d. none

21. Which of the following is used for outside exposed surfaces of wood, metal and doped fabric ?
    a. Aircraft spar varnish *
    b. Glyceryl phthalate spar varnish
    c. Combination of a. & b.
    d. none of the above.

22. Which of the following is used for finishing coat on wood metal ?
    a. Aircraft spar varnish
    b. Glyceryl phthalate spar varnish *
    c. both a. and b. combinely
    d. none.

23. A mechanical mixture of a varnish and a pigment is called as
    a. enamel b. lacquer
    c. varnish d. paint *

24. Which of the following is consists of sodium carbonate and potassium dichromate ?
    a. Alrok process *
    b. Chromating
    c. Chromium plating
    d. all.

25. Chromic acid bath without electric current is used as anodizing in
    a. alrok process b. chromatizing *
    c. both d. none.

26. Which of the following dries out on exposure ?
    a. solidification * b. volatile oil
    c. both d. none.

27. Which of the following evaporates when exposed to atmosphere ?
    a. solidification b. volatile oil *
    c. both d. none.

28. Which of the following has good brushing qualities
    a. Acid-resistant paint *
    b. Rust-preventive compound
    c. soya-bean-oil compound
    d. Marine glue.

29. Which of the following is manufactured from a coal star derivative and suitable solvent ?
    a. Bituminous paint *
    b. Soya - bean - oil compound
    c. Acid - resistant paint
    d. all.

30. Which of the following is pigmented with aluminium powder
    a. Soya - been - oil compound
    b. Bituminous paint *
    c. acid - resistant paid paint
    d. all.

31. Generous lapping of oil is necessary to protect the fabric from
    a. Acid resistant paint
    b. Bituminous paint *
    c. Marine glue
    d. Rust preventive compound.

32. Which of the following is universal choice for aircraft work
    a. Zinc chromate * b. enamel
    c. lacquer d. varnish.

33. In enamel which of the following act as a vehicle.
    a. pigment b. varnish *
    c. both partly d. none.

34. The effectiveness of anodic bath should be checked effectively by
    a. acid spray test b. water spray test
    c. salt spray test * d. alcohol spray test.

35. Potassium dichromate is effective inhibitor of corrosion in
    a. aluminium alloy * b. magnesium alloy
    c. copper alloy d. chromium alloy.

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CHAPTER - 63
METAL SPRAYING

1. The metal spraying is extensively used for
   a. spray welding
   b. reclamation of worm out parts
   c. anti - corrosive treatment
   d. both as b. and c.*

2. In metal spraying, any metal or alloy is used which can be drawn into wire, which are
   a. usually wound on two spools
   b. made into coils
   c. either of the above *
   d. for none of the above

3. To melt the wire, in metal spraying process, the compressed gases are used which are
   a. propane
   b. hydrogen
   c. dissolved acetylene or coal gas
   d. all above *

4. In metal spraying, the dry compressed air is required to the tune of
   a. 25 - 40 cu ft / min at 60 psi
   b. 20 - 35 cu ft / min at 40 to 60 psi
   c. 15 - 30 cu ft / min at 50 psi *
   d. 10 -15 cu ft / min at 30 psi

5. To prepare the surface for metal spraying it is to be rough so to be
   a. degreased in solvent
   b. sand blasted
   c. grit blasted *
   d. any of the above

6. The requirements of metal spraying are
   a. a spray pistol with suitable wire nozzle
   b. suitable length of wire for melting
   c. compressed combustible gas with pressure above 35 psi
   d. all above *

7. The function of metal spraying pistol are
   a. automatic feeding of wire
   b. the melting of the wire
   c. both of the above *
   d. none of the above

8. It is also desired that metal spraying pistol should
   a. atomise the molten metal
   b. bombardment of molten metal on surface
   c. clean the surface by gas blow
   d. perform as per a. and b.*

9. In metal spraying pistol MK - 16 :
   a. the wire is fed automatically by rollers
   b. rollers are rotated by a small turbine at 12000 to 15000 rpm
   c. turbine gets drive from compressed air
   d. all above is true *

10. The metal spraying process requires perfect synchronisation of
    a. wire feed
    b. flame conditions
    c. volume and pressure of compressed air
    d. all above *

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CHAPTER - 64
ANTI CORROSIVE TREATMENTS

1. Magnesium alloy tail or nose wheels hubs are 'aluminised' by
   a. anodising b. electroplating
   c. metal spraying * d. any of the above

2. In metal spraying, the metal or alloys used are those
   a. which can be forged
   b. which can be drawn into wire *
   c. either of the above
   d. none of the above

3. Metal spraying is done with
   a. spray nozzle
   b. pressurised molten metal with spray gun
   c. oxy - hydrogen pistol *
   d. none of the above

4. Molten tin, lead and zinc are most commonly used for
   a. metal spray b. metal dipping *
   c. both of the above d. none of the above

5. Before metal dipping the parts are thoroughly
   a. degreased with detergent
   b. cleaned chemically *
   c. washed in hot water and dry
   d. either of the above done

6. If zinc is used for coat by metal dipping method, it known as
   a. zinc plating b. anodising
   c. galvanising * d. None of the above

7. Stove enamelling consists of baking enamelled parts in an oven under controlled condition. This process gives a coat which is
   a. harder
   b. relatively weak
   c. durable
   d. as per a. and c.*

8. Generally the chromate treatment is given to
   a. alloy steels
   b. aluminium alloys
   c. magnesium and its alloys *
   d. none of the above

9. In the chromate process, the part is
   a. immersed in chromate solution for a definite period*
   b. coated with the chromate solution by a spray gun
   c. coated with chromate solution with the help of a ordinary brush
   d. either of the above

10. After chromate treatment, the part is thoroughly cleaned
    a. by running water
    b. by warm water and dried by warm air *
    c. by degreasing solution
    d. none of the above

11. The chromate film can be observed by formation of colour appearance
    a. of reddish complex b. of green tinge
    c. of yellow to black * d. none of the above

12. The Bowers Barff process is applied to
    a. magnesium alloy for storage
    b. Steel sheets for transit and storage *
    c. Light alloy sheets for storage
    d. None of the above

13. In Bowers barff process, the steel is :
    a. heated in a oven
    b. treated with steam and naptha
    c. process a. and b. are done but for only one hour *
    d. process a. and b. are done but for 24 hours

14. In Bowers barff process, after heating the steel and treated with steam and naptha for one hour then it is quenched in
    a. oil * b. water
    c. hot ashes d. air

15. The Bowers Barff process provides to steel
    a. hard and glass like skin
    b. a protective film of black in colour
    c. a protective film, yellow in colour
    d. as per a. and b. *

16. Phosphating process as a corrosion preventive is usually adopted for
    a. ferrous metal * b. non ferrous metals
    c. both of the above d. Either of the above

17. For phosphating the part is
    a. sprayed with acid phosphate solution
    b. immersed in acid phosphate solution for a period of time
    c. heated with acid phosphate solution very near to boiling point
    d. treated as per b. and c. *

18. The phosphating coating is porous, hence part is to be finished with
    a. oil b. paint
    c. varnish or lacquer d. any of the above *

19. Phosphating is known as
    a. anodising b. coslettising
    c. parkerising d. both b. and c. are correct*

20. Browning process of anticorrosive treatment is to
    a. form dense oxide coating on steel by accelerating rusting, cyclically
    b. immerse the rusted part in boiling water, and scratch brushing
    c. perform as per a. and b. and finally oil the work *
    d. do nothing as above

21. In Browning process the protective coating is formed by :
    a. Subjecting the work to several cycles of rusting and finally oiling *
    b. Iron oxide
    c. Coating with oil
    d. None of the above

22. Corrosion prevention by cementation process in done by
    a. heating the part in close contact with the dust of given metal *
    b. providing a coat of molten metal
    c. spraying the dust of metal on the already heated part
    d. either of the above

23. In cementation process, if aluminium dust is used then it is known as
    a. calorising * b. sharadising
    c. anodising d. none of the above

24. In cementation process if zinc dust is used then it is known as
    a. galvanising b. calorising
    c. anodising d. sharardising *

25. Blueing process of corrosion preventive method is carried out on
    a. steels * b. gray cast iron
    c. non - ferrous metals d. all above

26. In blueing process, the treatment imparts
    a. blue protective finish
    b. a film of oxide on metal
    c. the confirmation of definite temperature
    d. all above if heat is uniform *

27. In blueing process, the heat is applied
    a. by direct application b. by a sand bath *
    c. either of the above d. none of the above

28. During blueing process, after heating when desired colour is obtained
    a. the part is quenched in oil
    b. the part is quenched in water
    c. the part is cooled in air
    d. the action as per a. and b. is done *

29. The flash or oil blackening process of corrosion preventive consists of
    a. heating the article
    b. dipping in oil and drain extra oil
    c. burning the left over oil on article
    d. all above in sequence *

30. The flash or oil blacking process form
    a. a very thick protective film of oxide
    b. a carbonaceous deposit on surface *
    c. either of the above
    d. none of the above

31. The flash or oil blacking process in usually used for
    a. large components of ferrous metals
    b. small parts, such as, screws, blades and swivel etc*.
    c. all parts which have intricate shapes
    d. all above types of parts

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CHAPTER - 65
SEMI - PERMANENT ANTICORROSIVE TREATMENTS

1. The semi - permanent, anti - corrosive treatments, provides the coating of corrosion resistant materials, the coating are :
   a. tough
   b. elastic
   c. hard
   d. all of above type *

2. The protective materials of semipermanent anti - corrosive treatments are in liquid form, that may be
   a. an oil
   b. volatile liquid
   c. a solvent
   d. any of the above *

3. The protective material is applied by
   a. brushing
   b. spraying
   c. dipping
   d. any above method *

4. The semi permanent anti - corrosive treatment are often employed as :
   a. permanent corrosive prevention
   b. protection to thin film anti corrosive treatment
   c. either of the above *
   d. none of the above

5. To protect from atmospheric corrosion, the temporary treatment is adopted, the materials used is
   a. oil, grease
   b. lanolin, mineral jellies
   c. some inert material or compound
   d. any of the above *

6. The organic protective materials for temporary treatments are applied by
   a. brushing
   b. spraying
   c. dipping
   d. any of the above *

7. To treat the corroded parts of ferrous metal;
   a. the rust is to be removed by rust removing solution
   b. clean with metal decreasing liquid and remove corrosion and clean again
   c. apply primer and synthetic protective finish
   d. proceed as above in sequence *

8. Lightly corroded aluminium sheets or surfaces of the parts may be treated by
   a. cleaning with degreasing liquid and remove protective finish with paint remover
   b. clean metal and remove corrosion with thinner or kerosene
   c. clean metal and treat with "Deoxidine 202" and apply primer
   d. doing all above in sequence *

9. To protect the damage to the chromate film, the corroded magnesium alloy parts are cleaned with
   a. paint remover
   b. stiff fibre brush *
   c. emery cloth
   d. any of the above

10. To treat the lightly corroded parts; the parts are prepared by
   a. cleaning with degreasing liquid, removal of protective finish and further cleaning
   b. removal of corrosion and by swabbing with solution of chromic acid crystals
   c. washing in clean water and swab in the solution of selenious acid crystals
   d. all above methods in sequence *

11. To treat the corroded magnesium alloy parts, the yellow magnesium alloy primer is applied in
   a. single coat
   b. two coats *
   c. three coats
   d. four coats

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CHAPTER - 66
CRACK DETECTIONS

1. Magnifying glass is useful for
   a. crack detection
   b. enlarged view of very small formations
   c. inspection to observe which is not possible with naked eyes
   d. all above *

2. The hot fluid and chalk test is a satisfactory method for crack detection, but can be applied only to
   a. smaller components which can be removed from aircraft *
   b. larger components which cannot be removed from aircraft
   c. ferrous metals
   d. non - ferrous metals

3. In hot fluid and chalk test method of crack detection, the process consists of
   a. heating a mixture of kerosene (3 parts) and lubricating oil (one part)
   b. a bath which is heated to 90^{o}C
   c. a heated bath in which component is to be tested is immersed
   d. all above *

4. In hot fluid and chalk test component is immersed in heated bath till it attains the bath temperature, then
   a. it is removed, cleaned and dried quickly
   b. rolled in french chalk
   c. it is allowed to cool
   d. all above is done in sequence *

5. In hot fluid and chalk test after rolling into french chalk, the component is allowed to cool, then;
   a. on cooling oil will be forced out from any crack
   b. crack will be indicated by the stain of french chalk of yellowish colour
   c. cracks will be visible in dark colours
   d. it will happen as per a. and b. in sequence *

6. The cold fluid and chalk test is applied on the components
   a. which are removed from aircraft
   b. which can not be dismantled *
   c. only of ferrous metal
   d. only of non - ferrous metals

7. The cold fluid and chalk test procedure consists of
   a. painting the components with the mixture of oil and french chalk
   b. painting the component with the mixture of methylated spirit and french chalk *
   c. either of the above
   d. none of the above

8. In the cold fluid and chalk test, after application of mixture of methylated spirit and french chalk, when spirit evaporates
   a. crack will be visible in reddish colour
   b. crack can be seen as stains on coating of french chalk *
   c. either of the above may happen
   d. none of the above will happen

9. The electromagnetic method of crack detection can only be used on parts
   a. which can not be magnetised
   b. capable of being magnetised *
   c. made of non ferrous metal
   d. any of the above

10. To detect crack by electromagnetic method, the part to be tested is magnetised by
    a. placing it directly across the poles
    b. after the application of direct current to an electromagnet
    c. passing the AC current through a coil and use magnetic field to magnetise the part
    d. either as per a. and b. or as per c.*

11. To detect the crack, after magnetising the component, apply the detecting ink. If there is any crack, will be indicated
    a. by a thick black line
    b. because crack creates magnetic poles
    c. as fine solid particles of ink adhere to poles
    d. due to all above *

12. Dye penetrant method of crack detection
    a. gives a more definite indication of cracks
    c. is more reliable then fluid and chalk method
    c. is less reliable then fluid and chalk method
    d. proves as per a. and b.*

13. Dye penetrant kit (Ardrox 996) contains
    a. penetrant	b. penetrant remover
    c. developer	d. all above *

14. In dye penetrant method of crack detection, as the developer is dried; the cracks will be shown as
    a. red lines	b. red spots
    c. either of the above *	d. none of the above

15. In dye penetrant method of crack detection
    a. component is needed to be dismantled
    b. component need not to be dismantled
    c. suspected part may be tested in situ
    d. testing is possible as per b. and c.*

16. The dye penetrant is
    a. deep red liquid b. slow to evaporate
    c. able to flow in any crack d. all above *

17. State which is true
    a. penetrate remover is viscous and is able to absorb penetrate
    b. as the developer dries a smooth white coating will form
    c. the cracks will appear as red traces in the white coating
    d. all above are true *

18. The fluorescent method is similar to ardrox 996, but :
    a. component is placed in a wire basket
    b. component is immersed in fluorescent solution tank
    c. fluorescent is sprayed instead of developer
    d. method is as per a. and b.*

19. In fluorescent method, the component is
    a. immersed in fluorescent from one to ten minutes
    b. component is allowed to dry and cleaned in water
    c. maintained at 40°C in solution
    d. treated as per a., b. and c.*

20. In fluorescent method, after removal from the solution, the component is
    a. allowed to dry for 3 to 4 minutes and washed in water
    b. five minutes after washing it is ready for examination
    c. examined in dark room under a ultraviolet lamp
    d. all above is done in sequence *

21. In fluorescent method, during examination, the cracks will be indicated as
    a. red lines b. bright lines
    c. patches of light d. both b. and c. are correct*

22. Radio graphy method of crack detection is used where;
    a. economy is desired
    b. stripping is impossible
    c. dismantling is costly
    d. conditions are as b. and c. *

23. Radiography is generally used to detect the flaws in
    a. sheets b. castings and forgings *
    c. weldings and brazing d. none of the above

24. In radio graphic method of crack detection, the thinner sections, internal blow holes, cavities and cracks appear
    a. darker then their surroundings *
    b. brighter then their surroundings
    c. no change in appearance on film
    d. all above are wrong

25. In radiography method of crack detection is similar to normal photography and the rays used are
    a. x - ray or gamma rays * b. ultra violet rays
    c. laser rays d. none of the above

26. The advantage of the gama ray over x - ray is that
    a. it does not need electrical power
    b. cheaper then x - ray
    c. it posses both above qualities *
    d. it posses nothing above

27. Ultrasonic method of crack detection consists of
    a. cathode ray tube
    b. probe with a special crystal
    c. either of the above
    d. both of the above *

28. The ultrasonic waves, they
    a. penetrate into solids
    b. can not pass through an air gap or vacuum
    c. pass through both above
    d. do as per a. and b.*

29. When AC current is supplied to the crystal, in ultrasonic method
    a. it oscillates
    b. its oscillation causes ultra - sonic waves to set up
    c. the ultra - sonic waves sets up, perpendicular to crystal
    d. all above happens *

30. Before the ultra sound method is used, the component is cleaned and oiled, because of
    a. to prevent air gap *
    b. to lubricate for probe movement
    c. both above
    d. none of the above

31. In ultrasound system of crack detection, the cracks will be indicated on
    a. oscilloscope * b. photo film
    c. probe d. none of the above

32. The principle for eddy current method of crack detection is
    a. the magnetic field of a coil carrying AC current close to a conducting object induces eddy current in it
    b. the eddy current depends upon defect and material
    c. both as above *
    d. none of the above

33. By eddy current method, the size and location of defect can be found by
    a. reading on oscilloscope
    b. measurement of eddy current *
    c. fluctuation in AC input
    d. none of the above

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CHAPTER - 67
AR &N DB (MS & PP)

1. Materials and process panel of AR & DB was constituted in:
   a. 1971 * b. 1975
   c. 1980 d. 1985

2. Material and process panel has placed emphasis on:
   a. development of special equipment, fabrication technologies
   b. materials for direct applications
   c. process technologies, facilities & future R&D programmes
   d. all above *

3. In 1985, the emphasis was placed on advance technologies because of developments of
   a. LCA & ALH b. Kaveri engine
   c. guided missiles d. all above *

4. Electron beam machine for welding was developed in 1988 by:
   a. NAL b. IIT
   c. HAL d. BARC *

5. Electron beam welding machine developed by BARC is
   a. fully indigenous
   b. with imported gun *
   c. assembled with imported parts
   d. brought up as (b) & (c)

6. Electron beam welding machine developed by BARC is used by:
   a. HAL b. Ordinence Factories *
   c. Bharat Earth movers d. BHEL

7. Electro chemical milling machine is developed by
   a. BARC b. NAL *
   c. HAL d. DMRL

8. Commercial production of electro chemical milling machine has been
   a. taken up by HMT
   b. handed over to HAL
   c. transferred to private industry *
   d. taken up by none

9. Electro chemical milling machines are used for
   a. general machining b. precision components
   c. areo foil shapes d. b. & c. machining *

10. Electro discharge machine is developed by
    a. DMRL b. HAL
    c. IIT d. NAL *

11. Electro discharge machine is extensively in use at
    a. Ordinance Factories b. HAL
    c. BHEL d. NAL *

12. Electro discharge machine is a
    a. welding machine
    b. drilling machine
    c. spark erosion machine *
    d. all above

13. Hot torsion test facility is designed and developed by
    a. HAL Koraput b. HAL Bangalore *
    c. HAL Nasik d. HAL Lucknow

14. At hot torsion facility, metals developed indigenously are tested for the use on
    a. Adour b. Kaveri
    c. LCA d. Adour & Kaveri *

15. Hot torsion test machine is used by
    a. production
    b. engine development agencies
    c. both above *
    d. none of the above

16. Thermal fatigue testing is developed by
    a. HAL (B) * b. CVD
    c. HAL (KPT) d. none

17. Thermal fatigue testing facility is used for
    a. evaluation of super alloys
    b. testing of super alloys for airworthiness
    c. testing of stainless steels
    d. as mentioned in a. & b. *

18. Indigenously developed high strength Al - Li alloy technology has been established to add lithium upto
    a. 1.5% b. 2%
    c. 2.7% * d. 3%

19. Casting of Al - li alloy has been achieved with ingots of
    a. 40-50 kgs b. 50-75 kgs
    c. 100-125 kgs d. 100-150 kgs *

20. Ingots of 100-150 kg size has been achieved upto dia of
    a. 40 mm b. 60 mm
    c. 80 mm d. 100 mm *

21. IISc Bangalore has evaluated the technology to test Al-li alloy's mechanical properties for
    a. corrosion resistance
    b. hydrogen embrittlement
    c. both the above
    d. stiffness

22. Technology developed by IISC Banglore will be transferred for commercial exploitation of Al-li alloy to
    a. DRDO b. BHEL
    c. BALCO d. HAL (BD) *

23. Production of silicon carbide whisker from rice husk is developed by
    a. BALCO b. CGCRI *
    c. BHEL d. all above

24. Whisker developed from rice husk by CGCRI has the yield of
    a. 50% b. 10%
    c. 15% * d. 20%

25. Electro discharge machine is used for manufacture of
    a. dies
    b. turbine blades cooling channels
    c. both above *
    d. none of the above

26. Sic whiskers developed from rice husk by CGCRI, to evaluate properties in composite form are supplied to
    a. DRDO b. DMRL
    c. NPL d. both b. and c. *

27. Development of aluminium alloy investment casting was for
    a. Avro aircraft components
    b. Dornier aircraft components *
    c. HF aircraft components
    d. all above aircrafts

28. Aluminium investment casting process was developed by
    a. DMRL b. BALCO
    c. HAL (BD) * d. NPL

29. Superplastic forming of Al and Ti for various thickness, size and shape were established by
    a. IIT Madras * b. HAL Koraput
    c. DMRL d. BALCO

30. Number of missile components were fabricated on
    a. super plastic forming process of Al and Ti *
    b. Al-li alloys
    c. cast irons
    d. none of the above

31. Integrated data base management and expert system has been developed at
    a. HAL b. NAL *
    c. BHEL d. all the above

32. Validations of data base management and expert system is done at
    a. NAL b. ADA
    c. HAL d. both NAL / ADA *

33. Four processes developed by IIT Madras, RRI Trivandrum, NML Jamshedpur are on
    a. super plastic forming
    b. short fibre re-inforced composites
    c. development of whiskers
    d. all above *

■■■

CHAPTER - 68
AIRCRAFT TIMBERS AND PLYWOOD : INTRODUCTION

1. Ash, Oak, Beech, Mahagony, Shisham, Walnut, Teak etc. woods comes under the group of
   a. Deciduous (Hard) * b. Coniferous (Soft)
   c. Exogeous d. None of the above

2. Spruce, fir and pine woods are
   a. Deciduous woods b. Coniferous woods *
   c. either of the above d. both of the above

3. Sitka spruce is extensively used in aircraft, its place of origin is
   a. British Colombia * b. Honduras
   c. Canada d. None of the above

4. The wood used for longerons, engine bearers and wing tips are made of
   a. Mahagony b. Ash *
   c. Walnut d. Balsa

5. The wood which has a distinctive odor and is resinous also is strong and tough
   a. obtained from the Douglas fir tree *
   b. is used for aircraft construction parts which are highly stressed
   c. is comparatively light in weight
   d. have all above

6. Aircraft bulkheads and panels etc. are, usually made from
   a. Walnut b. Ash
   c. Balsa d. Birch ply Gd. I *

7. The wooden propellers are made from
   a. Sitka Spruce b. Mahagony *
   c. Balsa d. Walnut

8. Normally the walnut is used for
   a. Hinge points b. stressed points
   c. cores fairing d. a. and b.*

9. Usually the ash wood is procured from
   a. Canada b. South America
   c. British Isles * d. Himalayans

10. The lightest among the following aircraft timber is
    a. Walnut b. Ash
    c. Mahagony d. Balsa *

11. When peak loads are imposed momentarily then
    a. wooded air craft is preferred *
    b. aluminium air craft is preferred
    c. iron air craft is preferred
    d. none of the above.

12. Wood permits stressing almost to the breaking point because of its
    a. good tensile property
    b. good compressive property
    c. good elastic property *
    d. none.

13. The greatest disadvantage of wood is that it has
    a. weak impact strength
    b. weak tensile strength
    c. poor elastic property
    d. non homogeneity of wood *

14. Which of the following does not come under the conifer class of wood ?
    a. softwoods b. deciduous *
    c. needle leaf d. evergreen.

15. Which of the following come under hardwoods class?
    a. soft woods b. needle leaf
    c. evergreen d. non coniferous *

16. Which of the following does not come under hardwoods ?
    a. deciduous b. broad leaf
    c. deioty ledons d. evergreen *

17. Palm and bamboo tree comes under
    a. conifers b. hard woods
    c. monocotyledons * d. none of these

18. Which of the following is relatively heavy in weight?
    a. conifers b. hard wood *
    c. monocotyledons d. none of these.

19. A soft central part of a trunk is called as
    a. pith * b. heart wood
    c. sap wood d. bark.

20. Concentric rings surrounding central soft part is called as
    a. pith b. hearth wood *
    c. sap wood d. bark.

21. The heart wood is surrounded by
    a. pith b. heart wood
    c. sap wood * d. bark.

22. Sap wood is followed by
    a. pith b. heart wood
    c. sap wood d. bark *

23. Modulla is technical name of
    a. bark b. hearth wood
    c. pith * d. sap.

24. Which of the following reduces into paint or a small void ?
    a. bark b. hearth wood
    c. sap d. pith *

25. Duramen is a technical name of
    a. pith b. sap
    c. hearth-wood * d. all.

26. Heartwood is a modified
    a. pith b. sapwood *
    c. bark d. none.

27. Which of the following does not serve any useful structural purpose
    a. sapwood b. pith
    c. bark * d. none.

28. When severe bending must be done which of following is preferable
    a. sap wood * b. pith
    c. bark d. hearth wood

29. Which of the following is heavier and tougher
    a. sap wood b. pith
    c. bark d. hearth wood *

30. Which of the following contains alive cells and used for storage & translocation of food
    a. sap wood * b. pith
    c. bark d. hearth wood

31. Alburnum is a technical terms of
    a. pith b. heart wood
    c. sap wood * d. bark

32. Which of the following is true for a wood structure
    a. weak bending strength
    b. poor stiffness
    c. low hardness *
    d. all above.

33. Tangential sawing lugs are commonly called as
    a. plain sawed b. flat - grain surface
    c. both a. & b. * d. quarter - sawing.

34. Which of the following is much expensive
    a. plain sawing b. flat grained surface
    c. tangentially sawing d. quarter sawing *

35. Vertical grain stands for
    a. plain sawing b. flat grained surface
    c. tangetialy sawing d. quarterly sawing *

36. The grain of wood is determined by
    a. the direction of fibre *
    b. the length of fibre
    c. the distribution of fibre
    d. none of the above.

37. When the direction of sawing is not parallel to the bark which of the following results
    a. spiral grain resulted in
    b. diagonal grain *
    c. inter locked grain
    d. all.

38. When the fibre takes a spiral course in tree trunk the grain results in
    a. diagonal grain
    b. inter locked grain
    c. curly grain
    d. none *

39. When adjacent layers of wood are spirally inclined in opposite direction the grain results is called as
    a. spiral grain b. diagonal grain
    c. inter locked grain * d. heavy grain

40. The result of wood fibers in a tree following a contoured course is
    a. spiral grain
    b. diagonal grain
    c. inter locked grain
    d. heavy grain/curly grain *

41. The strength of wood is
    a. inversely proportional to specific gravity
    b. directly proportional to specific gravity *
    c. independent of specific gravity
    d. none of the above.

42. With 10 % increase in specific gravity of wood the shock resistance increases by
    a. 10 % b. 20 % *
    c. 30 % d. 40 %,

43. 1 cubic inch is equivalent to
    a. 16 cubic centimeter
    b. 16.4 cubic centimeter *
    c. 36 cubic centimeter
    d. none of the above.

44. In general, strength of wood is
    a. directly related to locality of growth
    b. inversely related to locality of growth
    c. independent of locality of growth *
    d. none.

45. The strength of wood is
    a. directly proportional to moisture content *
    b. inversely proportional to moisture content
    c. independent to moisture content
    d. none of the above.

46. In case of swamp growth, ash
    a. grows rapidly
    b. is inferior in weight
    c. is inferior in strength
    d. all *

47. In case of soft wood, the growth rate is
 a. directly related to strength
 b. inversely related to strength *
 c. independent of strength
 d. none.

48. The free water in wood is
 a. directly related to strength
 b. inversely related to strength
 c. independent of strength *
 d. none.

49. With decrease in the moisture content, the strength of wood
 a. decreases slowly
 b. decreases rapidly
 c. increases slowly
 d. increases rapidly *

50. A lens shaped opening between annual rings that contains resin is called as
 a. sloping grain b. knots
 c. pitch pocket * d. mineral streak.

51. Decay is frequently associated with
 a. sloping grain b. knots
 c. pitch pocket d. mineral streak. *

52. Which of the following is a longitudinal crack in wood running across the annual ring ?
 a. cheek * b. shake
 c. crack d. split

53. A longitudinal crack in wood caused by rough handling or other artificial means is called
 a. cheek b. shake
 c. crack d. split *

54. A longitudinal crack running between lin annual rings is called as
 a. cheek b. shake *
 c. crack d. split

55. Which of the following refers to the wide annual rings, found on the lower side of leaving trees ?
 a. compression wood * b. crack
 c. split d. sap

56. The modulus of elasticity of wood follows the relation
 a. $EC = \frac{PL^3}{48dI}$ * b. $EC = \frac{PL^2}{48dI}$
 c. $EC = \frac{PI^2}{48dL}$ d. $EC = \frac{PI^3}{48dL}$.

57. Which of the following is light, soft and tough wood?
 a. Beech b. ash white
 c. Birch d. Balsa wood. *

58. Which of the following not strong and durable when exposed to weather ?
 a. Balsa wood * b. beech
 c. Birch d. Elm.

59. Which of the following stands for heavy, hard, strong & tough wood ?
 a. Bass wood b. Beech *
 c. Birch d. Elm.

60. Which of the following is moderately heavy, soft and suffers from interlocked grain ?
 a. Elm , cork b. Gum, Red *
 c. Hickory d. Mahagony.

61. For manufacturing of ply wood for semihard furs or cores, which of the following is used ?
 a. Hickory b. Gum, Red *
 c. Elm., Cork d. Mahogamy.

62. Which of the following is the heaviest and hardest wood ?
 a. Hickory * b. Gum, Red
 c. Elm, Cork d. mahagony tree.

63. Aircraft propellers are manufactured from
 a. Hickory b. Gum, Red
 c. Elm, Cork d. mahagony tree *

64. Which of the following is derived from resorcinol and formaldehyde ?
 a. Resorcinol phenolic glue *
 b. Alkaline phenolic glue
 c. Casein glues
 d. none.

65. Which of the following is used within four hours of it's preparation ?
 a. Alkaline phenolic glue.
 b. Resorcinol phenolic glue.
 c. Casein glues *
 d. none.

66. Casein glues and water by weight in ratio of 1 : 2 results in
 a. liquid glue * b. solid glue
 c. none d. all .

67. Which of the following is a hot- pressed resin poly wood assembled with a synthetic resin adhesive ?
 a. water proof ply wood *
 b. super pressed resin plywood
 c. molded airplane parts
 d. none.

68. Which of the following is assembled under pressure of 500 to 1500 p.s.i. with hot pressing ?
 a. water proof ply wood
 b. super pressed resin plywood *
 c. molded air plane parts
 d. none.

69. When the density of the plywood increases to double, the shear strength of super pressed reun plywood becomes
    a. 4 times
    b. 5 times
    c. 7 times *
    d. 8 times.

70. Normal moisture content of plywood is
    a. 7%
    b. 12%
    c. between a. & b. *
    d. more than 12%.

71. Kiln drying of wood based on
    a. external humidity only
    b. temperature only
    c. moisture content of wood only
    d. all of the above *

72. Which of the following formed by piling the green lumber under a shed ?
    a. Air seasoning of wood
    b. Kiln drying of wood
    c. both a. & b. *
    d. none.

■■■

CHAPTER - 69
FABRIC AND DOPES

1. Which of the following refer to the direction of twist of yarn making up a thread ?
   a. ply b. warp
   c. twist * d. sizing

2. No. of yarns making up a thread is called
   a. ply * b. warp
   c. twist d. sizing.

3. The direction along the length of the fabric is known as
   a. ply b. warp *
   c. twist d. sizing.

4. The direction across the width of the fabric is known as
   a. ply b. warp
   c. fill * d. sizing.

5. The woven threads that run across the fabric is called as
   a. ply b. warp
   c. filling picks * d. sizing.

6. The count is no. of threads per inch in
   a. warp b. sizing
   c. twist d. both a. & b. *

7. The process of momentarily dipping cotton yarn or fabric is called as
   a. twist b. mercerization *
   c. filling d. filling

8. Which of the following is a material that is used to condition the yarn to facilitate the measuring of the cloth ?
   a. Twist b. yarn
   c. sizing * d. warp.

9. The number of yarns making up a thread is
   a. filling b. warp
   c. ply * d. sizing

10. Which of the following is the finishing tape that is doped over each rib or seam to cover stitching
    a. Reinforcing b. Sewing thread
    c. Rib lacing cord d. surface tape *

11. Which of the following is used over fabric and under the rib stitching to prevent the stitching cord ?
    a. surface tape b. Reinforcing tape
    c. sewing thread d. Rib lacing cord

12. Which of the following is used for cross-bracing ribs and bindings ?
    a. Rib lacing cord b. Reinforcing tape *
    c. sewing thread d. surface tape.

13. Which of following is used to sew the fabric to the ribs
    a. Rib lacing cord * b. Re-inforced taped
    c. Sewing thread d. surface tape.

14. Which of the following is designed to resist fraying due to weaving action of fabric and wing ribs
    a. Rib lacing cord * b. sewing thread
    c. Reinforcing tape d. surface tape.

15. Sufficient dope must be used on surface tape to
    a. increase smoothness *
    b. increase weight
    c. increase strength
    d. above.

16. Which of the following provides neat, smooth and finished appearance
    a. surface tape * b. sewing thread
    c. Reinforce tape d. Rib lacing cord.

17. Dissolving cotton in nitric acid yields
    a. Nitrocellulose dope *
    b. cellulose acetate dope
    c. combination of a. & b.
    d. none.

18. Which of the following is more fire resistant ?
    a. Nitrocellulose dope
    b. cellulose acetate dope *
    c. both a. & b.
    d. none.

19. Which of the following provide more satisfactory finish
    a. Nitro cellulose dope *
    b. Cellulose dope
    c. both
    d. none.

20. Blushing affects strength of dope film as
    a. it reduces it sufficiently *
    b. it improves it sufficiently
    c. it does not effect at all.
    d. none.

21. Wings are covered by
    a. envelope b. blanket
    c. both * d. none.

22. Sewing up several width of fabric of definite dimensions is called as
    a. envelope * b. blanket
    c. both a. & b. d. none.

23. The machine sewing requirement are
    a. one row with 8 inch
    b. two row with 8 inch
    c. two row with 10 inch
    d. either b. or c. *

24. Dope is used for
    a. adhesive purposes b. reconstruction
    c. joining d. all *

25. Wings may be covered with
    a. fabric * b. iron bars
    c. steel plates d. gold plates.

26. Which of the following is added in cellulose acetate dope to obtain desired consistency
    a. thinners * b. aluminium oxides
    c. paint d. none.

27. As compared to nitro cellulose dope, cellulose acetate dope is
    a. more expensive * b. equal cost
    c. less expensive d. none.

28. Panels should be doped in
    a. horizontal position *
    b. Vertical position
    c. inclined position
    d. none.

29. High temperature or current
    a. increases blushing but decreases evaporation
    b. increases blushing but increases evaporation *
    c. decreases blushing but increases evaporation
    d. decreases blushing but decreases evaporation.

30. The fabrics can be used to a longitudinal fairing strip parallel to the line of flight on
    a. high speed planes
    b. low speed planes
    c. flat sides fuse lages
    d. both a. & b. *

31. Which of the following necessary for dope room
    a. temperature > 70°F
    b. humidity < 60%
    c. both a. & b. *
    d. none.

32. Which of the following condition needs addition of excessive thinner
    a. temperature >70°F
    b. temperature <70°F *
    c. humidity > 60 %
    d. humidity <60 %.

33. The fabric holds it taut for fuselage covering if
    a. it's sides are concave
    b. it's sides are convex *
    c. it's sides are plane
    d. all above.

34. High speed air planes do not involve
    a. double stitching b. single stitching *
    c. bias tape d. blanket.

35. Lacing should be
    a. closer to capstrip * b. farther to capstrip
    c. either of above. d. none.

36. For hand stitching
    a. 6 to 7 stitch/ inch is used
    b. 6 to 8 stitch/inch is used *
    c. 6 to 9 stitch/inch is used
    d. 6 to 10 stitch inch is used.

37. For hand sewing the wax should not exceed
    a. 10% b. 20% *
    c. 30% d. 15%.

38. Tape is applied after
    a. first coat of dope * b. second coat of dope
    c. third coat of dope d. none.

39. For experimental aircraft
    a. blanket method is used *
    b. envelop method is used
    c. sleeve method is used
    d. none of the above.

40. The machine sewing can be used with
    a. the envelope method *
    b. the blanket method
    c. both
    d. none.

41. State which is true
    a. warp is the direction along the length of fabric
    b. filling or weft is the direction across the width of fabric
    c. ply is the number of yarn making up a thread
    d. all above are true *

42. Count is the
    a. number of threads per inch in warp or filling *
    b. number of yarn making up a thread
    c. the direction of twist of yarn making up a thread
    d. none of the above

43. Mercerization is the process of
    a. sizing by conditioning in starch to facilitate weaving
    b. dipping the cotton yarn or fabric, preferably under tension in diluted caustic soda *
    c. both mentioned above
    d. none of the above

44. The mercerized cotton cloth is usually used as aircraft fabric to cover
a. wings b. fuselages
c. tail planes d. all above *

45. The grade A fabric contains
a. 80 to 84 threads per inch
b. two ply yarn with weight of 4 ounces / yd
c. minimum tensile strength 80 lbs / ps
d. all above *

46. The fabric used for light air plane and gliders are not the same the fabric used for gliders have
a. more weight, less threads per inch
b. lesser strength
c. more width
d. all above *

47. The linen fabric made from Irish flax is also an aircraft fabric similar to cotton fabric grade 'A', but
a. it is less strong
b. it have less weight and more threads per inch
c. it will take on acetate dope finish excellently *
d. its dope finish is not as good as cotton fabric

48. Which statement is false
a. surface tape is the finishing tape which is doped over each seam
b. re - enforcing tape is used to prevent stitching cord to cut - fabric
c. balloon cloth is used for surface tape
d. none of the above is false *

49. Fabric covering of wings and fuselages are covered by
a. envelope method
b. blanket method
c. combination of both above *
d. none of the above

50. For fuselage fabric covering
a. by sleeve method, the several width of fabric are joined by machine sew
b. by blanket method all seams are machine sewed except the longitudinal seam along the bottom centre of fuselage
c. by either of the above method, the seams must be paralleled to longitudinal axis
d. all above is done *

51. The aircraft fabrics are given the dope coating to
a. make it a air and water tight
b. prevent deterioration due to weather and sun light
c. provide smooth surface to reduce skin friction
d. do all above *

52. Dopes are stored
a. in a isolated room
b. at temperature about 70 ^{o}F
c. in humidity below 60 %
d. in all above condition *

53. The number of dope coats applied to a fabric surface, depends upon the finish required. It is customary to
a. put 2 to 4 coats of clear dope
b. put 2 coats of pigmented dope over the coats of clear dope
c. to apply surface tapes and patches prior to second clean dope coat
d. do all above *

54. The freshly doped surfaces get blushed due to
a. high humidity and temperature
b. high rate of evaporation
c. high rate of air flow current
d. all above *

55. To prevent the dope to deteriorate the paint coating below the fabric, apply
a. dope proof paint
b. zinc chromate primer
c. aluminium foil of 0.0005" thickness with glue
d. any of above *

56. Nitrocellulose dope base made by
a. dissolving cotton in nitric acid
b. by adding plasticizers
c. mixing both above *
d. none of the above

57. Nitrocellulose dope are generally used as
a. they are cheap
b. they posses good tiantening quality
c. resistant to atmospheric change
d. all of above *

58. Cellulose acetate dope consists of solution of
a. cellulose acetate
b. plasticizers such as, dybutyl tartrate etc.
c. both as a. and b.*
d. nothing above

59. Cellulose acetate dope
a. is expensive
b. more fire resistant
c. does not give good finish on cotton fabric
d. posses all above *

60. Thinner such as benzol or ethyl alcohol is used to
a. obtain required consistency of dope *
b. dry the dope fast
c. make dope surface smooth
d. obtain all above

61. Pigments dopes consists of
a. base solution with plasticizer
b. clear dope with coloured pigment *
c. both of the above
d. none of the above

■■■

CHAPTER - 70
PLASTICS

1. Plastics are the larger group of
   a. synthetic material
   b. natural organic material
   c. both a. and b. *
   d. none.

2. Which of the following is the first plastic manufactured ever ?
   a. nitrocellulose * b. formal dehyde
   c. natural resin d. none.

3. Plastics are manufactured by process of
   a. poly hydration b. poly oxidation
   c. pulverization d. polymerization *

4. Which of the following plastic is the largest plastic ?
   a. synthetic resin plastics *
   b. natural resin
   c. cellulose
   d. protein plastics

5. The plastic manufactured from skimmed milk is called as
   a. cellulose
   b. natural resin
   c. protein plastics *
   d. thermosetting plastics.

6. Which of the following plastics are very much hygroscopic in nature ?
   a. protein plastic *
   b. natural resins
   b. thermosetting plastics
   d. cellulose

7. Which of the following plastic is heated repeatedly to obtain different reshapes ?
   a. cellulose
   b. natural resins
   c. thermoplastics *
   d. thermosetting plastics

8. Which of the following plastic is infusible ?
   a. natural resins
   b. thermosetting plastics *
   c. thermoplastics
   d. protein plastics.

9. Post forming is an operation that is dealing with
   a. natural resins
   b. thermosetting plastics *
   c. thermoplastics
   d. protein plastics.

10. Celluloid stands for
    a. cellulose nitrate * b. cellulose acetate
    c. regenerated cellulose d. none.

11. Cellophane stands for
    a. cellulose nitrate
    b. cellulose accetate
    c. regenerated cellulose *
    d. none.

12. Which of the following can not be reshaped after once being fully cured ?
    a. thermoplastics
    b. thermosetting plastics *
    c. both
    d. none.

13. The treatment with formal dehyde
    a. hardens the material *
    b. soften the material for reshape
    c. increases shearing stress
    d. none.

14. Pen and pencil barrels are manufactured from
    a. natural resins
    b. thermoplastics
    c. thermosetting plastics
    d. cellulose *

15. Electrical insulator and telephone parts are generally manufactured from
    a. natural resins *
    b. thermoplastics
    c. thermosetting plastics
    d. cellulose

16. Sheets, rods or tubes are obtained from
    a. natural resins
    b. thermoplastics
    c. protein plastics *
    d. thermosetting plastics.

17. Which of the following plastics can be molded satisfactorily ?
    a. thermoplastics
    b. thermosetting plastics
    c. cellulose
    d. both a. & b. *

18. Addition of alpha cellulose and wood flour
    a. improves electrical property
    b. increases heat resistance
    c. improves magnetic property
    d. increases strength *

19. Mica and asbestos are added to molding to
    a. improve heat resistance
    b. improve strength
    c. improve electrical property *
    d. improve magnetic property.

20. Which of the following is equivalent to press forging of metals ?
    a. transfer molding
    b. injection molding
    c. jet molding
    d. compressive molding *

21. Which of the following molding process is used for simple and thick parts ?
    a. compressive molding *
    b. jet molding
    c. injection molding
    d. transfer molding.

22. Which of the following is equivalent to die casting of metal ?
    a. Compressive molding
    b. transfer molding
    c. injection molding *
    d. jet molding.

23. Complicated parts with reasonable weight can be manufactured by
    a. compressive molding
    b. injection molding
    c. transfer molding *
    d. jet molding.

24. Modification of compressive molding is
    a. injection molding
    b. transfer molding *
    c. jet molding
    d. all.

25. Modification of injection molding is
    a. compressive molding
    b. transfer molding
    c. jet molding *
    d. none.

26. Very low weight, simple designed parts are molded by
    a. compressive molding
    b. transfer molding
    c. injection molding *
    d. jet molding

27. Very low weight, complicated parts are molded through
    a. compressive molding b. transfer molding
    c. injection molding d. jet molding. *

28. High pressure molding is
    a. transfer molding *
    b. compressive molding
    c. jet molding
    d. injection molding.

29. Which of the following provides good dimensional accuracy ?
    a. compressive molding
    b. jet molding
    c. transfer molding
    d. injection molding *

30. A high production rate is obtainable with
    a. compressive molding
    b. jet molding *
    c. transfer molding
    d. injection molding.

31. The removal of the fins and flashes are only finishing operation required on
    a. transfer molding
    b. injection molding
    c. jet molding
    d. compressive molding *

32. Which of the following process is limited only to thermosetting materials ?
    a. extruding
    b. lamination
    c. casting *
    d. injection molding.

33. Slow baking is used for hardening in case of
    a. casting * b. lamination
    c. extruding d. none.

34. In which of following process the material soften by heating and if then forced by a die through an aperture of the desired shape ?
    a. extruding * b. lamination
    c. casting d. none.

35. Which of the following is a variation in injection molding ?
    a. casting b. laminating
    c. extruding * d. all.

36. A number of sheets are plied on top of each other and placed in a hydraulics press in
    a. casting b. extruding
    c. laminating * d. none.

37. In manufacturing of curved and odd shapes which of the following is preferred ?
    a. casting b. compressive molding
    c. extruding d. laminating *

38. Plastics are joined by means of
    a. rivets b. bolts
    c. screws d. all *

39. Drilling of composites should be done with drills made of
    a. high speed steel * b. mild steel
    c. cast steel d. magnesium steel.

40. Which of the following is an important aircraft structural material ?
    a. glass reinforced laminates *
    b. glass fabric
    c. cotton reinforied lumination
    d. none.

41. Glass fabric can be used at
    a. high pressure laminates only
    b. low pressure laminates only
    c. both a. & b. *
    d. none.

42. Which of the following are not reinforced in low pressure laminating
    a. cotton fabric b. glass fabric
    c. glass fibre d. none *

43. Complicated parts of around 1 pound weight can be manufactured by
    a. compressive molding
    b. jet molding *
    c. injection molding
    d. transfer molding.

44. Simple parts and of weight around 2 pounds are preferably manufactured by means of
    a. compressive molding
    b. jet molding
    c. injection molding *
    d. transfer molding.

45. The complicated parts of weight around 50 pounds are manufactured by
    a. compressive molding
    b. jet molding
    c. injection molding
    d. transfer molding *

46. The simple and with 50 pounds weight, having reasonable thickness, then the plastic parts are manufactured by
    a. compressive molding *
    b. jet molding
    c. injection molding
    d. transfer molding

47. As compared to jet molding in injection molding
    a. larger parts are manufactured
    b. low pressure is required
    c. both a. & b. *
    d. none.

48. The nozzle leading into mold is continuously cooled by water except when ram pressure is applied in
    a. injection molding
    b. jet molding *
    c. compressive molding
    d. extruding

49. The molding compound heated in a chamber from which it is forced by a ram into relatively cold mold in
    a. injection molding *
    b. jet molding
    c. compressive molding
    d. Extruding.

50. High speed production is obtainable with
    a. injection molding *
    b. extruding molding
    c. casting molding
    d. compressive molding.

51. The phenolic plastics are those which are made by
    a. treating cotton cellulose with nitric acid
    b. mixing sour milk with formal dehyde
    c. mixing phenol (carbolic acid) with formal dehyde *
    d. all above

52. The plastics are classified as
    a. natural resin and synthetic resin plastics
    b. cellulose plastic
    c. protein plastics
    d. all above *

53. The plastics are sub - divided, depending upon their reaction to heat i.e.
    a. cellulose b. Thermo plastics
    c. thermosetting plastics d. as per b. and c.*

54. The synthetic plastic is the largest group and is made from
    a. phenol, urea and formaldehyde
    b. glycerol, phathalic anhydride
    c. acetylene and petroleum
    d. all above *

55. Phenol formaldehyde, urea formal dehyde and melamine formaldehyde synthetic plastics are
    a. thermoplastics b. thermosettings *
    c. both of above d. none of the above

56. The basic raw material for cellulose plastic are
    a. ordinary cotton b. wood pulp
    c. either of the above * d. none of the above

57. Usually, the drafting instruments, photographic films, transparent windows and aircraft dopes are made from
    a. synthetic resin b. natural resin
    c. cellulose * d. none of the above

58. Protein plastics are made from
    a. casein of skimmed milk and soyabean meal
    b. ordinary cotton and wood pulp
    c. by hardening the product of a. with formaldehyde
    d. as mentioned in a. and c. *

59. The thermo plastic material will
    a. repeatedly soften when heated
    b. repeatedly harden when cooled
    c. not soften with repeated heat
    d. behave as per a. and b.*

60. The thermosetting plastics
    a. are chemically changed by first application of heat
    b. are infusible during repeated heating
    c. soften when heated repeatedly
    d. behaves as per a. and b.*

61. The manufacturing processes adopted to create usable forms of plastic for industrial applications are
    a. moldings and castings
    b. Extruding and laminating
    c. all of the above *
    d. none of the above

62. There are various type of molding processes adopted to create various varieties of plastic products, such as
    a. compression and transfer moldings
    b. Injection and jet moldings
    c. all of the above *
    d. none of the above

63. The compression molding consisting of heating the mold compound in a heated mold cavity and then applying pressure with the other half of mold at
    a. 1000 to 20000 psi *
    b. as high as 1000000 psi
    c. 100 to 200 psi
    d. 500 to 1000 psi

64. Transfer molding is modified version of compression molding, where the required amount of material is heated in a container above the mold and then is forced into mold at pressure of
    a. 100000 psi *
    b. 1000 to 20000 psi
    c. 500 to 1000 psi
    d. none of the above

65. Injection molding is like diecasting for thermoplastic of light weight and simple design. In this process
    a. compound is heated in a chamber and then forced by ram pressure to cold mold
    b. compound is forced in mold under high pressure
    c. with fully automatic machinery, high speed production is obtainable
    d. both a. and c. are correct *

66. The thermosetting material parts of complicated designs up to 1 pound weight can be jet molded, in this process
    a. the nozzle leading into mold is continuously cooled by water except when ram pressure is applied
    b. when ram pressure is applied, the extreme heat is generated at nozzle
    c. the material passing through the nozzle is thoroughly heated and plasticized
    d. all above happens *

67. Casting process of plastic is usually limited to thermosetting material which are
    a. poured into the molds
    b. hardened by slow baking
    c. needed to be cured for longer period
    d. manufacture as per a., b. and c.*

68. By extruding method, the heated thermo plastic materials are used to produce
    a. rods, tubes and strips
    b. cable and wire insulation
    c. of various sections of desired shape, by forcing the soften material through die
    d. all above *

69. The laminating process is applicable to thermosetting plastic materials it consists of
    a. re - enforcing material
    b. synthetic resin binder
    c. fusion of reinforcing material impregnated with resin binder under pressure and temperature
    d. all above but pressure from 1000 - 2000 psi is applied by hydraulic press at 300 ^{o}F. *

70. For lamination process of plastic production, the reinforcements used usually are
    a. cotton fabric
    b. glass fabric and fiber
    c. paper
    d. all above *

71. The strength of cast and mold plastic is
    a. very high
    b. not sufficiently high
    c. not suitable for structural work
    d. as said in b. and c. *

72. Some of the cast phenolic resins
    a. do have good compressive properties
    b. are used to make forms and dies
    c. are as above *
    d. nothing sorts of above

73. The laminated plastics show much batter promise to use for
    a. aircraft structural parts
    b. their electrical properties
    c. both above *
    d. none of the above

74. The plastic materials are joined with
    a. rivets with washer
    b. coarse threaded screws or bolts with washers
    c. cycleweld and vinylseal type of cements as per load conditions
    d. any of the above *

75. Plastic can be machined with out difficulty, but reinforced thermo setting plastic are
    a. very hard on cutting tool
    b. causing the tools to get dull rapidly
    c. to be worked with harder and high speed tools
    d. all as above *

76. Indicate the true statement
    a. thermo setting plastics have very little ductility at room temperature
    b. it is difficult to mold the high pressure laminates
    c. low pressure laminates can be molded practically any desired shape *
    d. all above statements are correct

77. The partially cured laminated sheets can be post formed in this process
    a. work must be brought to temperature and form quickly
    b. polymerization and setting will occur with heat and time
    c. heated work (»350 °F) quickly placed in dies and pressured for short time
    d. all above is desirable *

78. The use of various plastic products in aircraft construction is applied to make
    a. fairings
    b. radomes
    c. doors and ducts
    d. all above *

79. During post forming of partially cured laminated sheets
    a. are heated in hot air oven, oil bath or in contact with hot plates
    b. it take 20 to 60 seconds to heat them to 350 °F
    c. under heat becomes soft at 250 °F and blister at 350 °F
    d. all above happens *

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CHAPTER - 71
TRANSPARENT MATERIALS

1. The transparent material used for aircraft windshields and windows, are
   a. shatterproof glass b. laminated sheet glass
   c. transparent plastics d. all above *

2. In general, transparent plastic have few disadvantages. Such as it
   a. gets scratched and distorted
   b. get discoloured
   c. is to be frequently changed
   d. all above *

3. Shatterproof glass consists of
   a. two or more pieces of glass
   b. a single sheet of transparent plastic
   c. a single plastic sheet hold two glasses together by the transparent adhesive
   d. all above *

4. Laminated plate glass is used for
   a. wind shield * b. side windows
   c. sky light windows d. all of above

5. Laminated sheet glass is usually used for
   a. sky light windows * b. wind shields
   c. side windows d. none of the above

6. The non scatterable glass is tested for
   a. impact test *
   b. temperature resistance test
   c. hardness test
   d. a. and b.

7. For large wind shields, tough glass is required. Hence, glass is tempered by
   a. heating uniformly to 1250 ^{o}F
   b. after heating, quenching suddenly to room temperature
   c. as above in sequence *
   d. heating and quenching in oil

8. The chief problem in the use of plastic for wind shields and cabin hoods is
   a. to allow for its expansion and contraction *
   b. that it get scratched
   c. it gets discoloured and distorted
   d. all above

9. When installing transparent plastics in a frame work, it is necessary for expansion and contraction to allow
   a. 1/4 inch movement in 12 inches
   b. 1/8 inch movement in 8 inches
   c. 1/8 inch movement in 12 inches *
   d. none of the above

10. State which is true for the following transparent thermo plastics
    a. pyralin is pyroxylin nitrocellulose plastic
    b. plastecele is cellulose acetate plastic and its manufacturing process is same as pyralin
    c. flaxi glass and leucite are acrylic thermo plastics which are transparent and does not discolor
    d. all above statements are correct along with to say that allite -39 is an allyl - base transparent thermo setting plastic.*

11. In case of bombers
    a. high grade laminated plate glass is used *
    b. laminated bullet resistant glass is used
    c. shutter proof glass is used
    d. all.

12. Perfect vision is obtainable in
    a. high grade laminated plate glass *
    b. laminated bullet resistant glass
    c. shutter proof glass
    d. all

13. Shutter proof glass is
    a. scatterable glass
    b. non scatterable glass *
    c. corrosive glass
    d. none.

14. Laminated plate glasses are manufactured from
    a. glass of class A *
    b. class B glass
    c. glass C glass
    d. class D glass.

15. To provide mechanical mounting, which of the following is preferable
    a. laminated plate glass *
    b. laminated sheet glass
    c. both equally
    d. none of the above.

16. Which of the following two types of glass is providing more distortion ?
    a. laminated plate glass
    b. laminated sheet glass *
    c. both
    d. none.

17. Laminated plate glass for aircraft are procurable in
    a. flat shape only
    b. curved shape only
    c. both *
    d. oval shape only.

18. Which of the following is obtainable in thickness from 3/16 inch up
    a. laminated plate glass *
    b. laminated sheet glass
    c. both a. & b.
    d. none.

19. A pressure differential between inside cabin and outside atmosphere is around
    a. 10 pound b. 12 pownd
    c. 10 - 12 pound * d. more than 12 pound .

20. Modulus of elasticity of glass is around
    a. 10,000 b. 10,000,00
    c. 10,000,000 * d. 1000.

21. The compressive strength of glass in general is ------------------------ in p.s.i.
    a. 360 b. 3600
    c. 36000 * d. 36,00,000.

22. The tensile strength of glass in general is ----------------- in p.s.i.
    a. 650 b. 6500 *
    c. 65000 d. 65,00,000.

23. Among the following the most strong glass is
    a. tempered glass * b. laminated steel glass
    c. laminated plate glass. d. none.

24. The tensile strength of tempered glass is
    a. 650 psi b. 65000 psi
    c. 3600 psi d. 36000 psi. *

25. Pyroxylin nitrocellulose plastic stands for
    a. pyralin * b. plastecele
    c. vinylite d. plexiglass and lucite

26. Which of the following is an alloy based thermosetting plastics ?
    a. pyralin b. plastecede
    c. vinylite d. none *

27. Which of the following is immune to crazing ?
    a. allite - 39 * b. lucite
    c. plexiglass d. plastecele.

28. Which of the following is called as oxryein thermoplastics ?
    a. allite - 39 b. plexiglass *
    c. plastecele d. vinylite

29. Which of the following plastic is non flammable?
    a. plexi glass b. lucile
    c. vinylite * d. allite 39

30. Which of the following are colourless and do not discolour on aging ?
    a. Plexi glass b. lucite
    d. vinylite d. acrylic plastic *

31. Which of the following can be formed only in single curvature section ?
    a. allite 39 * b. acrylic plastic
    c. plexiglass d. lucite.

32. Which of the following is a copolymer resin of vinyl chloride and vinyl acetate ?
    a. vinylite * b. allite
    c. plexiglass d. lucite.

33. Which of the following is a solid solution of nitro cellulose in camphor ?
    a. pyralin * b. plastecele
    c. vinylite d. acrylic.

34. Which of the following has 2/3 rd of coefficient of expansion that of cellulose plastic ?
    a. pyralin b. plastecele
    c. vinylite d. acrylic *

35. Which of the following is a thermoplastic material ?
    a. pyraline b. acrylic
    c. plastecele d. all *

36. Which of the following is a thermosetting plastic ?
    a. pyraline b. allite-39 *
    c. plastecele d. acrylic

37. Which of the following cracks easily when bolted ?
    a. pyraline b. allite -39 *
    c. plastecede d. acrylic

38. Which of the following is flame-resisting ?
    a. plastecede * b. pyraline
    c. plexiglass d. lucite

39. Which of the following plastics are inflammable ?
    a. pyralin b. plexiglass
    c. lucite d. all *

40. The plastic covered by army specification 12040 is
    a. allite 39 * b. acrylic
    c. plasticele d. pyralin

41. Specification AN - P - 44 stand for
    a. allite 39 b. acrylic plastic *
    c. plasticele d. pyralin

42. Maximum thickness available with pyralin plastic is
    a. 0.03 inch b. 0.05 inch
    c. 0.14 inch d. 0.15 inch. *

43. Which of the following plastics can be cast into compound - curved panels
    a. allite 39 * b. acrylic plastic
    c. plasticele d. pyralin.

44. With temperature range of 200 - 250°F which of the following plastics are manufactured
    a. allite 39 b. acrylic plastic *
    c. plasticele d. pyralin

45. Within temperature range of 200 - 200°F of the following plastic is manufactured
    a. allite 39 * b. acrylic
    c. plasticele d. pyralin.

46. Minimum thickness possible with the tempered glass is
    a. 1/2 inch b. 1/4 inch *
    c. 1/3 inch d. 1/5 inch.

47. Coefficient of expansion of tempered glass is
    a. 0.00003 per °F b. 0.000003 per °F *
    c. 0.0003 per °F d. 0.003 per °F.

48. The strength of tempered glass is because of it's
    a. surface tension b. surface elongation
    c. surface compression * d. all above.

49. At altitude of 25000 feet the cracking of plastic plate occurs because of
    a. external contraction b. external expansion
    c. internal expansion d. internal expansion. *

50. A general temperature differential over all flight goes over
    a. 20°F b. 30°F
    c. 40°F d. 50°F. *

■■■

CHAPTER - 72
RUBBERS & RUBBER COMPOUNDS

1. Which of the following is a polymer of isoprene ?
   a. natural rubber * b. buna S rubber
   c. Neoprene d. Butyl

2. Which of the following is a copolymer of butadiene and stryrene ?
   a. butyl b. neoprene
   c. buna S * d. buna N.

3. Which of the following is a polymer of chloroprene ?
   a. butyl b. Neoprene *
   c. Bunas d. thiokol.

4. Which of the following is a polysulfide polymer ?
   a. butyl b. thiokol *
   c. buna S d. buna N.

5. Copolymer of butadiene and oxylonitrile is
   a. butyl b. buna S
   c. buna N * d. all.

6. Copolymer of isobutylene and small amount of unsaturated hydrocarbons is
   a. neoprene b. buna S
   c. buna N d. butyle *

7. Which of the following rubber has better light resistance as compared to any other rubber ?
   a. butyle b. buna S
   c. buna N d. neoprene *

8. Which of the following rubber used for oil and gasoline hoses
   a. butyle b. buna S
   c. buna N * d. neoprene.

9. GR - 1 stands for
   a. Neoprene * b. buna S
   c. burn N d. butyle.

10. Which of the following rubber is abbreviated as monovinyl acetylene type
    a. neoprene * b. buna S
    c. buna N d. butyle

11. GR - A is an abbreviation of
    a. neoprene b. buna S
    c. buna N * d. butyle

12. GR - S is an abbreviation of
    a. neoprene b. buna S *
    c. buna N d. butyle.

13. GR - P is an abbreviation that stands for
    a. thiokol * b. natural rubber
    c. butyle d. neoprene.

14. Which of the following rubber has highest resistance to deterioration ?
    a. thiokol * b. natural rubber
    c. butyle d. neoprene.

15. Which of the following rubber is adversely affected by ozone and sunlight ?
    a. Thiokol b. buna N *
    c. buna S d. butylene.

16. Buna - S, Buna - N, neoprene, butyl and thiokol are the basic
    a. Natural rubbers
    b. synthetic rubbers *
    c. combination of natural and synthetic group
    d. none of the above

17. Natural rubber is available in the form of
    a. latex b. solid, powder
    c. liquid d. any of the above form *

18. Adhesion and cohesion qualities of natural rubber are
    a. excellent * b. good
    c. fair d. bad

19. The commercial availability of synthetic rubbers are in the form of
    a. latex, sheets and tubes
    b. moldings, rubberised fabrics and cements
    c. sponge materials and adhesives
    d. all above *

20. The natural rubber is
    a. a polymer of isoprene
    b. prepared from the sap of the plants
    c. easy to vulcanised or cure
    d. all above *

21. Buna - S synthetic rubber is co - polymer of
    a. butadiene and styrene *
    b. butadiene and acrylonitrile
    c. either of above
    d. none of the above

22. Buna - S synthetic rubber is used as substitute for natural rubber to manufacture
    a. tyres and tubes * b. gasket and seals
    c. fuel and oil hoses d. all of above

23. Buna - N is a co - polymer of butadiene and acrylonitrile, it
    a. has excellant resistance to oil
    b. can be vulcanised with sulphur
    c. can be cured to hard rubber
    d. possesses all above qualities *

24. Since Buta - N has a good resistance to abrasion and can withstand temperature upto 250ºF, it is used for
    a. oil and gasolene hoses
    b. tank liming, gaskets and seals
    c. hydraulic accumulator bags
    d. all above *

25. Neoprene is the polymer of chloroprene and has good resistance to oil and excellent resistance to heat. Hence it is used for
    a. oil resistance hoses
    b. carburettor diaphragms
    c. balloons, cements and tapes
    d. all above *

26. Butyl is a co - polymer of
    a. Iso butylene and small amount of butadiene
    b. butadiene and small amount of isoprene
    c. Iso butylene and small amount of isoprene
    d. both as per a. and c.*

27. Butyl has excellant impermeability, so it may become the first choice for
    a. hoses and gaskets
    b. tyre and tubes, life jackets and gas masks etc.*
    c. fuel oil tanks
    d. fuel oil seals.

28. Sulphur compounds can cross-link the chances due to presence of
    a. double bonds * b. single bond
    c. tripple bonds d. none of the above.

29. Which of the following in the property of natural rubber
    a. good skid resistance
    b. good crack initiation
    c. low heat build up
    d. All the above *

30. Novor is
    a. A vulcanization reagent
    b. Basically they are diure thanes
    c. When mixed with rubber they dissociate into nitrosophenols.
    d. All the above *

31. Mastication is best carried out inwell cooled open mills below
    a. 40ºC b. 80ºC *
    d. 100ºC d. 150ºC

32. Which of the following is an advantage of Carbon black.
    a. It is a filler
    b. It is an reinforcing agent
    c. It stiffens and hardens the vulcanizate
    d. It provides electrical & thermal conductivity.
    e. All the above *

33. Which of the following is used as extracting oils in processing of SBR.
    a. Carbon black b. wax
    c. Zinc oxide * d. antioxidants.

34. Which of the following is used as accelerator in SBR.
    a. Carbon Black
    b. Zinc oxide
    c. Sulphur
    d. mecapto benzothiazole. *

35. Which of the following is used as protective agents:
    a. Antioxidants b. Waxes
    c. Antiozonants d. All the above *

36. Which of the following is high volume substitute of N.R.
    a. Kalrez
    b. Styrene Butadiene Rubber (SBR) *
    c. Urethane
    d. Thiokol

37. What is shelf life of HA-7610
    a. 3 months * b. 4 months
    c. 8 months d 12 months

38. What is application of HA-7610
    a. Manufacture of aircraft rubber extruded tubes
    b. Manufacture of rubber seals in used IPN media
    c. Manufacture of aircraft parts *
    d. Manufacture of rubber beadings for Jaguar air-craft.

39. What is use of HA - 7614
    a. manufacture of aircraft parts
    b. manufacture of aircraft rubber extended tubes *
    c. manufacture of rubber beadings of Kiran / Jaguar aircraft
    d. all the above

40. What is application of DRL(M) IPN3
    a. manufacture of aircraft parts
    b. manufacture of rubber tyres
    c. manufacture of rubber seals used in IPN media *
    d. none of the above

41. What is use of SBR -01.
    a. manufacture of aircraft parts
    b. manufacture of PVC Cables
    c. manufacture of rubber beadings for kiran/jaguar aircraft *
    d. All the above.

42. Higher percentage of acrylonitrile improves which property in Nitrile rubbers
    a. heat resistance b. Oil resistance
    c. Tensile strength d. all the above *

43. Which of the following is not a property of pure nitrile rubbers.
    a. oil resistance b. Abrasion resistance
    c. fuel resistance d. ozone resistance *

44. What is the application of Nitrile rubbers.
    a. used is aircraft parts.
    b. used in hose industry for transportation of oil *
    c. used in manufacture of tyre.
    d. used in Latex Industry.

45. What is the application of SEN-1001.
    a. rubber seals for use in ATF and oil media *
    b. aeronautical application.
    c. manufacture of rubber components
    d. manufacture of PVC Cables.

46. What is the major application of SEN -1010.
    a. rubber seals for use in ATF and oil media
    b. manufacture of rubber components in R11F engines.
    c. aeronautical applications *
    d. all the above.

47. What is the major application of HA-1818.
    a. rubber seals for use in ATF and oil media.
    b. manufacture of rubber components *
    c. aeronautical applications.
    d. tyre industry.

48. Which of the following is not a property of nitriles
    a. they have excellent resistance to mineral & vegetable oils.
    b. they have poor resistance to swelling action of acetones.
    c. they have poor resistance to petroleum oils *
    d. none of the above.

49. What is shelf life of HA -1821.
    a. 2 months b. 3 months *
    c. 4 months d. 6 months

50. What is shelf life of DRLM -A4
    a. 2 months b. 3 months
    c. 6 months * d. 8 months

51. What is shelf life of SMD-1813
    a. 3 months * b. 6 months
    c. 4 months d. 7 months

52. SMD -1813 is
    a. nitrile base rubber *
    b. SBR base rubber compound
    c. silicon base rubber compound
    d. none of the above.

53. HALTRILE -02 is
    a. Nitrile base rubber * b. SBR based rubber
    c. Natural rubber d. Silicon based rubber

54. SEN -1683 rubber is
    a. Nitrile based * b. SBR based
    c. N.R d. Silicon based

55. HA 1819 is
    a. Nitrile based * b. SBR based
    c. Natural rubber d. Silicon based

56. HA -7614 is
    a. nitrile based b. SBR based *
    c. natural rubber d. silicon based

57. DRL(M) compound No. IPN3 is
    a. Nitrile based b. Natural rubber
    c. SBR rubber * d. Silicon based

58. The major use of HALTRILE -05 is in
    a. manufacture of aerocraft and aeroengine applications *
    b. manufacture of tyres
    c. manufacture of foot wears
    d. all the above.

59. What is the shelf life of HALTRILE -10
    a. 16 months from the date of manufacture *
    b. 8 months from the date of manufacture
    c. 9 months from the date of manufacture
    d. 12 months from the date of manufacture.

60. SPN -6 is
    a. nitrile and chloroprene based rubber *
    b. nitrile and acrylonitrile based rubber
    c. SBR based rubber
    d. all the above.

61. The other name of chloroprene is
    a. sperene b. tulene
    c. teflene d. neoprene *

62. Which of the following is not a property of Nitrile in nitrile and chloroprene base rubber compounds.
    a. anti abrasion
    b. water resistant
    c. high temperature property
    d. good dielectric property *

63. HA1620C is
    a. nitrile & chloroprene based *
    b. SBR based
    c. silicon based
    d. N.R

64. The major application of SPN -6 is
    a. manufacture of foot wears
    b. manufacture of aircraft components *
    c. tyre industries
    d. all the above.

65. The best property of neoprene is
a. flame resistance b. oil resistant *
c. ozone resistant d. all the above.

66. Neoprene is made by
a. mixing nitrile and acrylonitrile rubbers
b. polymerization of chloroprene monomers *
c. polymerization of isoprene monomers.
d. polymerization of SBR monomers.

67. Chloroprene monomers undergo
a. solid polymerization
b. liquid polymerization
c. emulsion polymerization *
d. None of the above.

68. The category of neoprene rubber is
a. G b. W
c. T d. All *

69. Which of the following is true.
a. neoprene crystalise more readily than other rubbers*
b. their are 4 categories of neoprene
c. the momer units of neoprene undergo liquid polymerization.
d. all the above

70. Neoprene AC is
a. solution polymer *
b. sol polymer
c. non crystallizing polymer
d. soft crystal.

71. Neoprene AD is
a. solvent polymer
b. sol polymer *
c. non crystallizing polymer
d. soft crystal

72. Neoprene AF is
a. soft emulsion b. non crystal polymers *
c. chloroprene polymer d. none of the above.

73. Storage stability is maximum for
a. G types b. W types
c. T types * d. All the above.

74. Which of the following are raw polymers
a. G types b. W types *
c. T types d. none

75. Which of the following has maximum tear strength
a. G type *
b. B type
c. T type
d. All the above havesame.

76. Curing system for neoprene mainly consists of
a. metal oxides * b. polychlorides
c. asprene d. all the above

.77. Calcium oxide is used in curing of neoprene as
a. Vulcanizer b. desiccant *
c. elastomer d. none

78. Which of the following is not used as plasticizers in neoprene rubbers.
a. petroleum derivatives b. naphthenic oils
c. carbon black * d. dioctyl sebacate

79. Which of the following is not in any state of neoprene.
a. elastic b. plastic
c. granular d. dutonic *

80. In which of the following phase, neoprene is glossy, smooth and nerve free.
a. elastic b. plastic
c. granular * d. dutonic

81. Neoprene and hypalon rubbers are used in:-
a. adhesives b. wires & cables
c. hoses d. all the above *

82. Which of the following statement is false:-
a. Neoprenes have better oil resistance than natural rubber.
b. Neoprenes have better ozone and oxidation resistance than natural rubber.
c. Neoprenes age better and do not soften on heat exposure as do Natural rubber.
d. Neoprenes have better low temperature flexibility than Natural rubber *

83. Silicon rubbers derive their high strength from
a. silicon-oxygen bonds *
b. silicon-carbon bond
c. carbon-carbon bonds
d. carbon-hydrogen bond

84. Silicon polymers are synthesized primarily from
a. Trimethyl polychlorosilane
b. Dimethyl dichlorosilane *
c. Dimethyl trichlorosilane
d. Trimethyl trichlorosilane

85. In silicon polymers, zinc oxide is used as
a. Colourant b. plasticizer
c. both the above * d. none of the above

86. ________________ are used in compounds containing reinforcing fillers in order to improve processibility and to obtain an optimum balance of physical properties.
a. accelerators b. plasticizers
c. extenders * d. reinforcing fillers.

87. Which of the following is true for process aides
a. they have softening or plasticizing effect.
b. they retard crepe-ageing of raw compound.
c. process aides used are silica fillers.
d. all the above *

88. Silicon rubber parts are manufactured by:-
    a. compression moulding
    b. transfer moulding
    c. any of the above *
    d. none of the above.

89. VKS -2001 is a
    a. Nitrile base rubber compounds
    b. SBR based rubber compounds
    c. Silicon based rubber compounds *
    d. Fluorocarbon based rubber compounds.

90. Shelf life of VKS -2002 is
    a. 2 months b. 3 months
    c. 4 months * d. 10 months

91. Which of the following is not a silicon based rubber compound?
    a. VKS-2001 b. VKS-2002
    c. Poly-Sil d. TAPS -1 *

92. Which of the following rubber based compound is used in MIG aircraft.
    a. VKS-2001 b. VKS-2002
    c. Poly-Sil T5 * d. TAPS-1

93. Which of the following rubber compound is used in food processing industry & surgical equipments.
    a. Silicon rubber * b. nitrile rubber
    c. flouro carbon rubber d. neoprene.

94. Which of the following is the grade of flourocarbon rubber.
    a. VITON b. FLUOREL
    b. both of the above * d. Slab - 5

95. Most fluoro elastomer compounds are moulded by
    a. compression b. transfer
    c. injection d. all the above *

96. KALREZ is
    a. nitrile based b. silicon base
    c. SBR based d. fluoro carbon base *

97. Fluoro carbon rubbers are used in :-
    a. Valve seals b. Shaft seals
    c. V ring packers d. All the above *

98. Butyl rubber is made from
    a. Isobutylene b. Isoprene
    c. both the above * d. none of the above.

99. Which of the following is not a properly of butyl rubber ?
    a. Low rates of gas permeability
    b. High ozone & weather resistance
    c. High coefficient of friction
    d. High thermal stability *

100. Which of the following is not a property of chlorobutyl rubber?
    a. High permeability *
    b. High heat resistance
    c. Excellent flex resistance
    d. Ability to co-vulcanize with high unsaturation rubbers.

101. Clay when used as filler act as
    a. Semi-reinforcing agent *
    b. Compound stiffening agent
    c. Enhancer of compounding properties.
    d. none of the above.

102. Talc when used as filler
    a. Is reinforcing *
    b. causes compound stiffening agent
    c. enhances compounding properties.
    d. None of the above.

103. Hydrated silica when used as filler:-
    a. is semi reinforcing
    b. causes compound stiffness.
    c. enhances compounding properties *
    d. none of the above.

104. Petroleum based process oils when used as plasticizers.
    a. improve mixing and processing
    b. soften stocks
    c. enhance flexibility
    d. all the above. *

105. ________________ is considered highly useful in commercial rubber production.
    a. Nitro-butyl b. chlorobutyl *
    c. isobutyl d. Chloropropene.

106. Ethylene propylene rubber is also called.
    a. EP rubber b. EPDM rubber *
    c. PN rubber d. None of the above.

107. E P D M stands for
    a. Ethylene propylene diene methylene *
    b. Ethylene power double masticated
    c. Ethylene polymer double monomer
    d. None of the above.

108. E P R is used for
    a. roofing b. agriculture
    c. water distribution d. all the above *

109. Which of the following is orthorhomic amphiboles
    a. Anthophyllite * b. Riebeckite.
    c. Edenite d. Termolite

110. Which of the following is Monoclinic amphibole
    a. Anthophyllite b. Gedrite
    c. Riebeckite * d. None of the above.

111. Serpentine is the name of
   a. Asbestos type * b. Rubber type
   c. Mining equipment d. Snake poison

112. Maximum commercial asbestos is of ___________ variety.
   a. Chrysotile * b. Gedrite
   c. Riebickite d. Tremolite

113. Amphibole is
   a. Large tree
   b. Group of rock forming minerals *
   c. A variety of coal.
   d. Group of fuels used in aviation.

114. Which of the following elements is not part of Amphibole
   a. Na b. Ca
   c. Cu * d. Si

115. Asbestos is used in:-
   a. Construction materials
   b. Textile and insulation products.
   c. Plastics, packing & jointings.
   d. All of the above *

116. Asbestos is used mainly in construction materials because of :-
   a. Heat resistance
   b. Reinforcing strength *
   c. Compatibility with resins
   d. None of the above.

117. Asbestos is widely used in textile & insulation products because of
   a. heat resistance *
   b. Reinforcing strength
   c. compatibility with resins
   d. none of the above.

118. Asbestos is mainly used in plastic industry because of
   a. Heat resistance
   b. Reinforcing strength
   c. Compatibility with resins *
   d. None of the above.

119. In vinyl asbestos floor tiles:-
   a. Asbestos is advantage of providing wear & non slip properties *
   b. Asbestos has shiny surface
   c. Both (a) & (b)
   d. None of the above.

120. Textiles made from Asbestos compounds can bear temperature upto
   a. 200°C - above 1200°C
   b. 600°C *
   c. 400°C - above 3000°C
   d. 80°C - 330°C

121. The most widely used organic fibres is /are:
   a. Kevlar b. Twaron
   c. Nomex d. All the above. *

122. Aramids do not include
   a. Kevlar b. Twaron
   c. Carbon * d. Nomex

123. Kevlar fibre loses strength at
   a. 80°C b. 180°C *
   c. 380°C d. 680°C

124. Heat resistance of Kevlar fibre is upto
   a 180°C b. 250°C
   c. 350°C * d. 430°C

125. Nomex fibre can be used upto
   a. 180°C b. 230°C *
   c. 320°C d. 440°C

126. Kevlar and Twaron fibres
   a. are used in protective jackets
   b. difficult to tailor *
   c. both
   d. none.

127. Nomex fabrics
   a. are used in protective jackets. *
   b. difficult to tailor
   c. both (a) & (b)
   d. None of the above.

128. Aluminised nomex textiles can provide protection upto
   a. 200°C b. 250°C
   c. 300°C d. 400°C *

129. Which of the following statements is true for carbon based Asbestos fibres?
   a. They have more strength than Kevlar fibres.
   b. They are serviceable to about 200°C *
   c. They are not made by partial carbonization of acrylic fabrics.
   d. None of the above.

130. Tortglass fabrics can perform upto
   a. 900°C b. 1700°C
   c. 1500°C d. 1200°C *

131. Asbestos cloth is safe for use at temperatures well above _____________ in situations involving welding sparks and molten metal splashes.
   a. 700°C b. 900°C
   c. 1200°C d. 1500°C *

132. Friction products such as friction lining etc. contains
   a. Chrysotile asbestos *
   b. Glass wool
   c. PTFE
   d. None

133. The manufacture of packings & jointings depend on chrysotile because of:
   a. Its strength
   b. Absorptive capacity *
   c. High temperature with standing.
   d. None of the above.

134. Which of the following statements is true about champion style 59 - oil special asbestos.
   a. It is a joining sheet.
   b. It is compressed asbestos fibre
   c. They are used as Gasket material.
   d. All the above *

135. Which of the following is a synthetic natural rubber
   a. Neoprene b. Styrene butadiene
   c. Butadiene d. Polyisoprene *

136. Chemical name of rubber 'GRS' is:-
   a. Natural polyisoprene b. Isoprene
   c. Styrene Butadiene * d. Butadiene

137. Tensile strength of Natural rubber is (in MPa)
   a. 31.0 * b. 27.6
   c. 24.1 d. 20.7

138. Density of Isoprene or synthetic natural rubber is:-
   a. 930 kg/m^3 * b. 940 kg/m^3
   c. 1050 kg/m^3 d. 550 kg/m^3

139. The maximum recommended continuous temperature (^oC) for natural rubber is
   a. 70 b. 100 *
   c. 120 d. 90

140. The common name of chloroprene is
   a. Hypalon b. Buna N
   c. Neoprene * d. Isoprene.

141. The density of Neoprene is (in kg/m^3)
   a. 1100 b. 1000
   c. 1360-1270 d. 1240 *

142. The structure of rubber
   a. Crystal b. Chained
   c. Random d. Any of above *

143. When the chain with in a macromolecule consist of the same isomer, the polymer is said to be
   a. elastomer b. stereoregular *
   c. trans d. Cis.

144. Natural rubber is vulcanized with
   a. Carbon b. Boron
   c. Sulphur * d. None of these.

145. Which of the following is not a property of natural rubber
   a. less abrasion wear below 35°C *
   b. excellent fatigue resistance
   c. propogation resistance
   d. crack initiation.

146. Maximum use of natural rubber is in
   a. Metallurgy b. Tyre industry *
   c. Belts industry d. water tanks.

147. The important commercial source of natural rubber is
   a. rock named 'Hunter Rubbe'
   b. the lava of volcanoes
   c. the tree named 'Tappe vinca'
   d. Tree named 'Hevea Brasiliensis' *

148. The material added to the latex to prevent premature coagulation is
   a. Sulphur b. Polyester
   c. Ammonia * d. Calcium.

149. Natural rubber crystallizes spontaneously when stored in low temperatures. This is due to the property of
   a. Stability b. Crack initiation
   c. Stereoregularity d. Field coagulumation *

150. The melting point of crystallized unstretched rubber is
   a. 25°C b. 55°C
   c. 65°C
   d. depends on its crystallization temperature *

151. The method used for cross-linking natural rubber is
   a. Crystallization b. Vulcanization *
   c. Acceleration d. Processing.

152. Novor is
   a. Vulcanization reagent *
   b. Processing agent
   c. Stabilizing agent
   d. None of these.

153. Mastication is best carried out
   a. below 80°C * b. above 120°C
   c. either (a) or (b) d. none.

154. The most widely measure of processing quality is
   a. Viscosity * b. Tensile strength
   c. Stability d. Hardness.

155. Full form of SBR is
   a. Sterile Butile Rubber
   b. Styrene Butadiene Rubber *
   c. Sis-Buta Rubber
   d. Styrene Butile Rubber.

156. For maximum tensile strength and abrasion resistance
   a. Cold SBR is preferred *
   b. Hot SBR is preferred
   c. Both are preferred
   d. Depends on the use.

157. Which of the following statement is false
   a. SBR has better abrasion characteristics than NR
   b. SBR has better crack initiation than NR
   c. SBR has better heat resistance than NR
   d. SBR extrusions are not as smooth as that of NR *

158. The Raw materials for processing of SBR are
a. Butadiene b. Styrene
c. Both * d. None.

159. The co-polymer of butadiene and an unsaturated nitrile is called
a. Nitrile rubber * b. SBR
c. Neoprene d. Buta-Rubber.

160. Nitrile rubber find application in petro chemical industries due to
a. Good oil resistance properties *
b. Good crack initiation
c. Good heat resistance
d. Good and smoother extrusion properties

161. The acrylonitrile context varies between -------------- to ------------ in Nitrite rubbers
a. 30%, 45% b. 45%, 60%
c. 15%, 50% * d. 10%, 30%.

162. Higher acrylonitrile percentages improve
a. heat resistance
b. abrasion resistance
c. oil resistance
d. all of the above *

163. The temperature range for polyacrylic rubbers is
a. 10° - 200°C b. - 40°C to + 204°C *
c. 60°C to 250°C d. 55°C - 150°C.

164. Ozone resistance can be obtained with Blending materials such as
a. Polyvinyl chloride * b. SBR
c. NPT d. CCR.

165. The widely used filter in Reinforcing of Nitrite rubbers is
a. Carbon Black * b. Epichlorohydrin
c. Ethylene - propylene d. All.

166. Plasticizers are used in nitrile rubber compounds to
a. Reinforce
b. Vulcanize
c. Protector
d. To improve processing properties *

167. Vulcanization of nitrile rubbers is achieved with
a. Sulphur
b. Sulphur - donor
c. Peroxide
d. All of the above *

168. Which of the following is not a property of nitriles
a. They have excellent resistance to mineral.
b. They have excellent resistance to vegetable oils
c. They have good resistance to the swelling action of oxygenated solvents *
d. None of the above.

169 . Which of the following statements is false
a. Resistance of aromatic hydrocarbons is better than that of neoprene
b. Resistance of neoprene is better than that of aromatic hydrocarbon *
c. Resistance of poly sulphide is better than that of neoprene
d. Resistance of polysulphide is better than aromatic hydrocarbon.

170. The density of flurocarbon is (kg/m^3)
a. 1400 - 1980 * b. 2010
c. 1050 -1300 d. 930.

171. The tensile strength of flurocarbon is (MPa)
a. 13.8 b. 15.5
c. 17.2 * d. 34.5.

172. The recommended maximum continous temp (°C) for flurocarbon is
a. 290 b. 200
c. 300 d. 250 *

173. The density of Kalrez rubber is (in Kg/m^3)
a. 2010 * b. 1350
c. 1950 d. 1300.

174. The common name of Perfluro - elastomer is
a. Urethane b. Flurocarbon
c. Fluro-silicon d. Kalrez *

175. Which of the following statements is false
a. The tensile strength of urethane is between 34.5 - 55.2 MPa
b. The density of urethane is 1050 - 1300 kg/m^3
c. It has got bad tear resistance *
d. It has got excellent abrasion resistance.

176. The common name of poly-siloxane is
a. Silicon * b. Kolrez
c. Thiokal d. Silistock.

177. The density of NBR is (kg/m^3)
a. 1240 b. 1000 *
c. 1360 d. 1550.

178. Which statement is true for silicon rubbers
a. The strength of silicon rubber is higher than that of other rubbers
b. They have high fatigue resistance *
c. They have low fatigue resistance
d. They have low flex resistance

179. The shelf life of NIR 109 is
a. 1 year b. 2 years
c. 6 months * d. Three months.

180. The shelf life for polysil - 4 is
a. 4 months * b. 8 months
c. 9 months d. 1 year.

181. Silicon rubber can with stand temperatures upto
 a. 315°C * b. 400°C
 c. 250°C d. 600°C.

182. Which of the following is not a rubber based compound
 a. SH 60 ± 5 b. HALCONE -01
 c. NIR - 109 d. Asbestos *

183. Fluro carbon rubbers are
 a. exceptionally stable b. best heat resistant
 c. best ozone resistant d. all the above *

184. Commercial fluorocarbon rubbers are prepared by
 a. Curing
 b. Vulcanization
 c. Radical polymerization *
 d. Compounding.

185. Which of the following is not a processing or curing process for fluorocarbon rubbers
 a. Mill mixing b. Internal mixing
 c. Calendering d. Doving *

186. Fluroelastomers compounds are moulded by
 a. Compression b. Transfer
 c. Injection d. All *

187. Shelf life of 1316 is
 a. 3 months * b. 4 months
 c. 8 months d. 12 months.

188. Which of the following is not flurocarbon base rubber compounds
 a. VT - 1 b. VITON -1305
 c. MV 3075 LC66 d. Polysil - 2 *

189. The distinguishing feature of polybutadiene is
 a. microstructure * b. Macro structure
 c. Chained crystal d. None.

190. Which of the following statements is false
 a. Most polybutadienes are highly resistant to breakdown
 b. They have poor millbanding characteristics
 c. They are blended with carbon *
 d. They are commonly blended with other elastomers

191. Which of the following is bad Raw polymer at 25°C
 a. Nickel b. Lithium *
 c. Cobalt d. Uranium.

192. Which of the following is bad Raw polymer at 75°C
 a. Nickel b. Lithium *
 c. Cobalt d. Uranium.

193. Density of Fluoro-Silicon is (Kg/m^3)
 a. 1850 b. 1350 - 1650 *
 c. 1400 d. 1050.

194. Tensile strength of fluoro silicon is (MPa)
 a. 5.8 b. 13.8
 c. 5.5 - 9.7 * d. 34.5.

195. The recommended maximum continous temp.(°C) for fluoro-silicon is
 a. 290 b. 200 *
 c. 250 d. 100.

196. Which of the following is good flame resistance
 a. Acrylate b. Thiokol
 c. Silicon * d. Vamac.

197. What is common name of Ethylene lacrylite
 a. Vamac * b. Silicon
 c. Thiokol d. Acrylate.

198. The tensile strength (MPa) of vamac is
 a. 10.3 b. 17.2 *
 c. 18.9 d. 25.9.

199. What is the recommended maximum temp (°C) for Vamac
 a. 150 b. 70
 c. 200 - 240 d. 165 *

200. Which of the following is a rock forming mineral
 a. Vamac b. Neoprene
 c. Asbestos * d. Acrylate

201. More than 95% of the total asbestos production is
 a. long fibre type b. short fibre type *
 c. continous fibre type d. none of the above.

202. Full form of CAF is
 a. Compressed Added flux
 b. Complex added flourine
 c. Compressed Asbestos fibre *
 d. Complex added fibre.

203. CAF sheets are used in
 a. Tyre industries b. Gasket materials *
 c. PVC pipes d. none of the above.

204. The colour of asbestos is generally
 a. Black or Brown * b. Black or Green
 c. Red d. White.

205. Density of Asbestos is
 a. 0.5 g/cm^3 b. 1.5 - 2.0 g/cm^3 *
 c. 3.5 - 5 g/cm^3 d. 7 g/cm^3.

206. Which material is used as gasket materials is RIIF series engines of MIG Aircraft
 a. Ty M × 4240 - 54
 b. Champion style - 59 oil special Asbestos *
 c. D.B.P.C.
 d. 1316.

207. Champion style -54 special asbestos is used as
 a. Curing agent b. Milding agent
 c. Joining sheet * d. Insulating sheet.

208. Standard thickness of Ferronite sheet is
a. 0.4mm b. 55mm
c. 0.8 - 1.6 mm d. 2.6 mm *

209. Colour of ferronite is
a. Brownish red b. Sea green
c. Blackish grey * d. Black.

210. The appearance of the ferronite surface is
a. Rough b. Smooth *
c. Glossy d. none.

211. Which of the following is not a fossil fuel
a. Peat b. Uranium *
c. Natural gas d. Petroleum.

212. Which of the following is not a type of coal
a. Peat b. Anthracite
c. Lignite d. Coke *

213. The oxygen content is maximum in
a. Peat * b. Lignite
c. Bituminous d. Anthracite.

214. Powdered coke contains
a. 20% volatile matter
b. 30 % volatile matter
c. 10% volatile matter *
d. 50 % volatile matter.

215. The Product of destructive distillation of the coal in absence of air is
a. Pulvarized coal b. Coke *
c. Char coal d. none.

216. Pitch coke is made from
a. Charcoal b. Coal car ditch
c. Peat d. Pulverized coal.

217. The highest rank in coal is of
a. Peat b. Lignite
c. Anthracite * d. Bituminous.

218. Example of foundry coke is
a. Peat b. Lignite
c. Petroleum coke d. Densite *

219. Dulong´s formula is used to calculate
a. Calorific value of the coal *
b. Carbon content of coal
c. Fixed carbon content
d. Moisture content of coal.

220. Percentage of fixed carbon content is highest in
a. Lignite b. Peat
c. Anthracite * d. Bituminous.

221. Percentage of fixed carbon content is lowest in
a. Anthracite b. Bituminous
c. Lignite * d. All are equal.

222. The primary criteria of coal quality is
a. Percentage C * b. Percentage S
c. Percentage O d. Percentage moisture.

223. The secondary criteria of determining the coal quality is
a. Percentage C b. Percentage S *
c. Percentage O d. Percentage ash.

224. LCV = 81C + 3HO (H-0/8) + 228 - 5.84 (9H + M). This formula is
a. Pitot´s formula b. Dulong´s formula *
c. Euler´s formula d. none.

225. Pulverized coal is generally used for
a. Heating b. Smelting
c. Melting d. All *

226. The destructive distillation process by which coke is produced is called
a. Cooking * b. Fractional heating
c. Smelting d. None of the above.

227. Pitch Coke has
a. High carbon content b. Low ash content
c. Low sulphur d. All the above *

228. Coking involves
a. Pyralytic polymerization
b. Thermal decomposition
c. Both a. and b. *
d. None of these.

229. Densite coke consists of Petroleum coke amount
a. 20% b. 50% *
c. 40% d. 12.5%

230. Percentage of low volatile coal in foundry coke is
a. 20% b. 25
c. 35% d. 40%.

231. Percentage of anthracite fines in Densite coke is
a. 50% b. 25%
c. 12.5% * d. 6.25%.

232. Percentage of coaltar for pitch in densite is
a. 12.5% * b. 7.5%
c. 25% d. 55%.

233. Raw petroleum coke for industries is
a. Treated with O_z b. Calcined *
c. Vulcanized d. None of these.

234. Calcination causes
a. increase in volume
b. increase in C
c. shrinkage in volume
d. decease in specific gravity *

■■■

CHAPTER - 73
GLASSES

1. Glass is an ----------------- product of fusion of one or more oxides.
   a. Inorganic * b. Organic
   c. Both (a) & (b) d. Neither (a) nor (b)

2. Bottle glass contain Si O_2 upto
   a. 73% * b. 48%
   c. 82% d. 93%

3. Bottle glass contain Al_2 O_3 upto
   a. 1.2% b. 1.8% *
   c. 3.1% d. 4.0%

4. Bulb glass contain SiO_2 upto
   a. 70.3% * b. 65%
   c. 62% d. 61%

5. Bulb glass contain Al_2O_3 upto
   a. 1.0% b. 0.8%
   c. 1.4% * d. 2.2%

6. Pyrex contain SiO_2 upto
   a. 70.5% b. 89%
   c. 80.5% * d. 62%

7. Pyrex contain Al_2 O_3 upto
   a. 2.2% * b. 3.2%
   c. 4.2% d. 5.2%

8. SiO_2, H_2BO_3, Na_2CO_3, K_2 CO_3, $CaCO_3$, Mg Co_3 dolomite Pb_3O_4, aluminium silicate etc. are used as a raw material for the manufacturing of
   a. Glass * b. Ceramic
   c. Cermets d. None of the above.

9. Structure of glass is
   a. Crystalline b. Non Crystalline *
   c. Non amorphous d. Both (a) & (c)

10. For making glass raw materials of oxides & salts are melt in a furnace at
    a. 1400 to 1500°C * b. 900 to 1100°C
    c. 700 to 900°C d. 2200 to 2700°C

11. The fabrication of glass is carried out at a temperature of about
    a. 1000°C * b. 800°C
    c. 600°C d. 1200°C

12. Pressing is the ------------ fabrication method.
    a. Lowest cost * b. Average cost
    c. Highest cost d. None of the above.

13. Glass blowing is used to produce
    a. Hollow products *
    b. Solid products
    c. Complicated products
    d. Both (b) & (c)

14. Bottles are produced by
    a. Pressing b. Drawing process
    c. Glass blowing * d. All of the above.

15. The drawing process forms glass in to
    a. Tubings b. Rods
    c. Hollow shapes d. Both (a) & (b) *

16. In drawing process the drawn filaments are collected into bundles called
    a. Rods b. Strands *
    c. Bundled glass d. None of the above.

17. Sheet glass can be manufactured by
    a. Drawing b. Rolling
    c. Floating methods d. All of the above *

18. In ------------------, glass is drawn from a Molten pool and then passes through or over rollers
    a. Rolling b. Drawing *
    c Floating d. None of these

19. In ----------------, Molten glass passes between cooled rolls.
    a. Rolling * b. Drawing
    c Floating d. None of these

20. In ----------- the molten glass is formed into sheet on the surface of a pool of molten tin in a controlled atmosphere
    a. Rolling b. Drawing
    c Floating * d. None of these

21. The Annealing treatment involves heating the glass to its annealing Temperature range, holding it there for a period of time and then
    a. Cooling it slowly to room temperature *
    b. Quenched it
    c. Cooling it below O˚C
    d. None of the above

22. Tempering of glass involves heating it to around the softening point and then
    a. Cooling it slowly to room temperature
    b. Cooling it rapidly with blasts of air *
    c. Cooling it slowly below O˚C
    d. None of the above

23. Hydrofluoric acid is used for
    a. Welding b. Polishing
    c. Etching d. Both (b) & (c) *

24. Glass can be stained by
    a. Copper compounds
    b. Silver compounds
    c. Both (a) & (b) *
    d. Neither (a) nor (b)

25. Soda - lime glasses are useful at temperatures up to about
    a. 700 ^{0}F
    b. 860 ^{0}F (Annealed) *
    c. 960 ^{0}F
    d. 1200 ^{0}F

26. Soda lime glasses possess
    a. High thermal expansion *
    b. Low thermal expansion
    c. High thermal shock resistance
    d. None of the above

27. Soda - lime glasses possess --------- compare to other glasses
    a. High thermal shock resistance
    b. Low thermal shock resistance *
    c. Low coefficient of thermal expansion
    d. None of the above

28. Lead glasses are relatively
    a. Expensive
    b. Very much expensive
    c. Inexpensive *
    d. None of the above

29. Lead glasses have
    a. Low electrical resistivity
    b. High electrical resistivity *
    c. Low refractory index
    d. None of the above

30. Lead glasses possess
    a. High refractory index *
    b. low refractory index
    c. Refractory index is zero
    d. None of the above

31. Corrosion resistance of lead glass is
    a. is very poor
    b. is high
    c. is poor
    d. Varies with lead content *

32. Coefficient of thermal expansion of lead glasses increases with
    a. Lead content *
    b. SiO_2 content
    c. Al_2O_3 content
    d. Other then lead content

33. Lead glasses are poor in
    a. Electric resistance
    b. Acid resistance *
    c. Corrosion resistance
    d. None of the above

34. Thermal properties of lead glasses are
    a. Very good
    b. Poor
    c. Depend out on lead content *
    d. None of the above

35. As a group, in glasses, lead glasses are ----- in rigidity
    a. Highest b. Lowest *
    c. Average d. None of the above

36. Borosilicate glasses are ----------- of the glasses
    a. Cheapest b. Most expensive
    c. Most versatile * d. None of the above

37. Borosilicate glasses are noted for their
    a. Poor chemical durability
    b. Excellent chemical durability *
    c. Excellent machinability
    d. None of the above

38. Borosilicate glasses possess
    a. Excellent resistance to heat
    b. Excellent resistance to thermal shock
    c. Both (a) & (b) *
    d. Neither (a) nor (b)

39. Borosilicate glasses possess
    a. Low coefficient of thermal expansion *
    b. High coefficient of thermal expansion
    c. Both (a) & (b)
    d. Neither (a) nor (b)

40. The low expansion type Borosilicate glass is best known as
    a. Ovenware
    b. Pyrex ovenware *
    c. Cyrex ovenware
    d. None of the above

41. Maximum service temperature of Aluminosilicate in the annealed condition is about
    a. 1200 ^{0}F * b. 1600^{0}F
    c. 1800 ^{0}F d. 2000 ^{0}F

42. Fused silica is 100%
    a. Silicate b. Silicon tetraoxide
    c. Silica carbide d. Silicon dioxide *

43. If fusion of silica occurs Naturally, the glass is known as
    a. Natural Quartz b. Quartz
    c. Fused Quartz * d. None of the above

44. Fused silica glasses can be used at temperature upto
    a. 1400 ^{0}F in continuous service
    b. 1650 ^{0}F in continuous service *
    c. 1227 ^{0}F in continuous service
    d. 1300 ^{0}F in continuous service

45. Fused silica glasses can be used at temperature upto --------- in short term exposure
    a. 1500 ^{0}C b. 2300 ^{0}C *
    c. 2100 ^{0}C d. 1700 ^{0}C

46. Fused silica glasses possess
    a. Excellent resistance to chemicals *
    b. Poor resistance to chemicals
    c. Poor resistance to thermal shock
    d. None of the above

47. Ninety six percent silica glasses are --------- expensive than fused silica
    a. More b. Less *
    c. Equal d. None of the above

48. Borate glasses are
    a. Silicate glasses b. Non silicate glasses *
    c. Fused glasses d. None of the above

49. Borate glasses possess
    a. Very high light dispersion
    b. Very low light dispersion *
    c. Low refractive index
    d. None of the above

50. --------------------- contain small particles dispersed in transparent glass
    a. Opal glasses *
    b. Laminated and safety glass
    c. coloured glass
    d. None of the above

51. Photosensitive glass is sensitive to
    a. Ultraviolet light b. Heat
    c. Both (a) & (b) * d. Neither (a) nor (b)

52. Cellular or foam glass is made by heating a mixture of pulverized glass and a
    a. Foaming agent * b. Chemical agent
    c. Acids d. Basics

53. Cellular or foam glass is almost --------------- cork
    a. Very heavy than b. Very hard than
    c. As light as * d. None of the above

54. Coated glass has a thin ----------- surface
    a. Plastic b. Rough
    c. Metallic Oxide * d. None of the above

55. -------------- determines the suitability of glass for drawing into tubes, rods and for blowing rolling
    a. Chemical stability b. Viscosity *
    c. Fluidity d. None of these

■■■

CHAPTER - 74
POLYMERS

1. Natural polymers are derived from
   a. Plants b. Animals
   c. Both (a) & (b) * d. Neither (a) nor (b)

2. Proteins and enzymes are
   a. Natural polymer *
   b. Synthetic polymer
   c. Synthetic organic polymer
   d. Synthetic inorganic polymer

3. Wood is a -------------
   a. Synthetic polymer
   b. Synthetic organic polymer
   c. Synthetic inorganic polymer
   d. None of the above *

4. Rubber, leather & silk are -------------------
   a. Natural polymer *
   b. Synthetic polymer
   c. Synthetic organic polymer
   d. None of the above

5. Plastics & fibre materials are
   a. Natural polymer
   b. Synthetic polymer & also a Natural polymer
   c. Synthetic organic polymer *
   d. None of the above

6. Polymers have -------------------- density
   a. Low * b. High
   c. Very high d. None of the above

7. Polymers possesses
   a. Good corrosion resistance *
   b. Poor corrosion resistance
   c. High coefficient of friction
   d. Both (b) & (c)

8. Coefficient of friction of polymers is
   a. High b. Low *
   c. Average d. None of the above

9. Mouldability of polymers are
   a. Poor b. Very poor
   c. Good * d. None of the above

10. -------------------- can be produced with close dimensional tolerances
    a. Polymers *
    b. Sand moulds with less binders of additives
    c. Both (a) & (b)
    d. Neither (a) nor (b)

11. In polymers, -------------------- surface finish is obtained
    a. Poor b. Rough
    c. Excellent * d. Average

12. Polymers possesses
    a. Poor tensile strength *
    b. High temperature resistance
    c. Both (a) & (b)
    d. Neither (a) nor (b)

13. Polymers have
    a. High temperature resistance
    b. Low temperature resistance *
    c. High mechanical properties
    d. High tensile strength

14. Mechanical properties of polymers are
    a. Good b. Very good
    c. Excellent * d. Poor

15. ---------------- soften when heated and harden when cooled
    a. Thermoplastic polymers *
    b. Thermoset polymers
    c. Both (a) & (b)
    d. Neither (a) nor (b)

16. Most linear polymers and those having some branched structure with feasible chains are
    a. Thermoplastic * b. Thermosets
    c. Network polymers d. None of the above

17. Thermoplasts are relatively
    a. Hard & ductile b. Hard & brittle
    c. Soft & ductile * d. Soft & Brittle

18. Thermoplasts have
    a. Very high melting temperature
    b. Temperature above 2500^{o}C
    c. Low melting temperature *
    d. None of the above

19. Polyvinyl Chloride polystyrene are
    a. Thermoplasts * b. Thermosets
    c. Both (a) & (b) d. Neither (a) nor (b)

20. Polystyrene are used in
    a. Automobile bodies
    b. Fluorescent light reflector *
    c. Plastic lenses
    d. None of the above.

21. Poly methyl methacrylate are used in
    a. Fluorescent light reflector
    b. Plastic lenses *
    c. Both (a) & (b)
    d. Neither (a) nor (b)

22. Thermosetting polymers become soft during their first heating and become ------------- when cooled
    a. Coarse grained b. Again more soft
    c. Hard d. Permanently hard *

23. Thermoset polymers are generally
    a. Harder * b. Softer
    c. Less strong d. None of the above

24. Thermoset polymers have -------------- dimensional stability
    a. Poor b. Very poor
    c. Better * d. None of the above

25. Polyester resins are
    a. Thermosetting * b. Thermoplastic
    c. None of the above d. Cross linked polymers

26. Thermosets
    a. Can be recycled b. Cannot be recycled *
    c. Melts easily d. None of the above

27. The process of growing large molecules from small ones are known as
    a. Polymerization * b. Polymorphism
    c. Crystallization d. None of the above

28. Polymerization links together
    a. Mers b. Polymers
    c. Manomers * d. None of the above

29. In addition to -------------------, the polymer is produced by adding a second manomer to the first, then a third manomer to this dimer, a fourth to the trimer and so on until the long polymer chain is terminated
    a. Polymerisation * b. Polymorphism
    c. Crystallisation d. None of the above

30. ---------------- is an other kind of addition polymerization of two or more different manomers
    a. Copolymerization *
    b. Polymerization
    c. Condensation Polymerisation
    d. None of the above

31. Butadiene styrene, a rubber used in tyres is a example of
    a. Copolymers *
    b. Condensation polymers
    c. Addition polymers
    d. None of the above

32. When phenol & formaldehydes manomers are polymerized ------------- is released
    a. Phenol b. Formaldehydes
    c. Water * d. None of the above

33. The resulting product of reaction from polymerized formalhydes manomes, is
    a. Bakelite * b. Phenol - hydroxide
    c. Phenol - chloradane d. None of the above

34. Polyamides, polyesters, amino plastics are some of the
    a. Addition products
    b. Copolymerization products
    c. Condensation products *
    d. None of the above

35. A condensation product is always a
    a. Thermoset
    b. Thermoplastic
    c. Either a thermostat or a thermoplast *
    d. None of the above

36. Polymer processing consists of a series of operation carried out on polymeric materials to increase their
    a. Hardness b. Softness
    c. Ductility d. Utility *

37. The process of selection of additives and their corporation into a polymer is called
    a. Polymerization
    b. Crystallization
    c. Compounding *
    d. None of the above

38. Blending is a process of ----------------- the two or morepolymer resins to obtain a product with improved properties
    a. Welding b. Casting
    c. Mixing * d. None of the above

39. Physical blending is achieved by milling together two incompatible polymers and heating them to above their
    a. Softening points * b. Hardening points
    c. Melting point d. Tempering point

40. Filler materials are most often added to polymers to improve
    a. Tensile strength b. Compressive strength
    c. Both (a) & (b) * d. Neither (a) nor (b)

41. Dimensional and thermal stability of polymers areimproved by
    a. Hardening b. Filler materials *
    c. Tempering d. None of the above

42. Filler material particle sizes range all the way from ------------- to macroscopic dimensions
    a. 10 nm * b. 30 nm
    c. 45 nm d. 25 nm

43. To improve flexibility, ductility and toughness ofpolymers -------------- are added
    a. Additives * b. Filler materials
    c. Stabilizers d. Colorants

44. Additives used in polymers are also called as
a. Colorants b. Plasticizers *
c. Stabilizers d. None of the above

45. Plasticizers reduces the
a. Hardness b. Stiffness
c. Both (a) & (b) * d. Neither (a) nor (b)

46. Plasticizers are generally
a. Liquid * b. Gas
c. Solid d. Vapour

47. Plasticizers possess
a. Low vapour pressure *
b. High vapour pressure
c. Excellent Vapour pressure
d. None of the above

48. Plasticizers are commonly used in polymers that are intrinsically ------ at room temperature
a. Brittle * b. Ductile
c. Soft d. None of the above

49. Plasticizers have
a. Low molecular weight *
b. High molecular weight
c. Both (a) & (b)
d. Neither (a) nor (b)

50. Colorants impart a -------------- to polymer
a. Specific weight
b. Specific colour *
c. Specific structure
d. None of the above

51. Colorants may be added in the form of
a. Dyes b. Pigments
c. Both (a) & (b) * d. Neither (a) nor (b)

52. Pigments are filler material that do not dissolve but remain as a
a. Multiple phase b. Seperate phase *
c. Austenitic phase d. None of the above

53. In compression molding
a. Only above mold piece movable *
b. Only lower mold piece movable
c. Both mold pieces are movable
d. Neither (c) nor (b)

54. In compression molding before molding, raw materials may be mixed and cold pressed to a disc, which is called a -----------
a. Premolding b. Preform *
c. Premixing d. None of the above

55. In compression molding preheating of the preform reduces
a. Molding time b. Lifetime
c. Pressure d. Both (a) & (c) *

56. A variation of compression molding is -------------- in which the solid ingrediants are first melted in heated transfer chamber
a. Compression molding
b. Transfer molding *
c. Injection molding
d. None of the above

57. ------------- process is simply injection molding of a viscous thermoplastic through an open ended die
a. Extrusion * b. Casting
c. Blow molding d. None of the above

58. Rods & tubes are made by
a. Extrusion * b. Casting
c. Blow molding d. None of the above

59. Plastic containers are fabricated by
a. Extrusion b. Casting
c. Blow molding * d. None of the above

60. Castings are dimensionally
a. Stable * b. Not stable
c. Excellent accurate d. None of the above

61. Cold drawing of the polymer is carried out below its
a. Annealing temperature *
b. Normalising temperature
c. Tempering temperature
d. None of the above

62. Drawing is a -------------- process
a. Flow * b. Non flow
c. Repeated d. None of the above

63. Hot drawing refers to the deformation of crystalline or semi crystalline polymers at temperatures betweenthe annealing temperature and the
a. Normalising temperature
b. Melting point *
c. Hardening temperature
d. None of the above

64. In one case, the two different units are randomly dispersed along the chain in what is termed as
a. Random copolymer *
b. Alternate copolymer
c. Block copolymer
d. None of the above

65. A ----------------- is one in which identical mers areclustered in blocks along the chain
a. Random copolymer b. Alternating copolymer
c. Block copolymer * d. None of the above

66. For an -----------------, the two mer units alternate chain positions
a. Random copolymer
b. Alternating copolymer *
c. Block copolymer
d. None of the above

67. % crystallinity is given by

a. $\dfrac{\rho_c\,(\rho_s - \rho_a)}{\rho_s\,(\rho_c - \rho_a)}$ X 100 * b. $\dfrac{\rho_a\,(\rho_c - \rho_s)}{\rho_c\,(\rho_s - \rho_a)}$ X 100

c. $\dfrac{\rho_s\,(\rho_c - \rho_a)}{\rho_c\,(\rho_s - \rho_a)}$ X 100

d.. None of the above

68. The degree of crystallinity of a polymer depends on the

a. Rate of cooling during solidification *
b. Rate of heating during melting
c. Rate of thermal contraction during cooling
d. None of the above

69. Network polymers are almost totally

a. amorphous * b. Crystalline
c. Both (a) & (b) d. Neither (a) nor (b)

70. The fibre polymers are capable of being drawn into long filament having atleast a -------------- length to diameter

a. 27:9 b. 100 : 1 *
c. 40 : 20 d. 60 : 1

■■■

CHAPTER - 75
ADVANCE COMPOSITES : INTRODUCTION

1. The most simple composite is composed of
   a. bonding substance matrix
   b. re - enforcing material
   c. both above *
   d. none of the above

2. The composite products may have the re - enforcing materials such as
   a. fiber glass
   b. carbon / graphite
   c. thermoplastic
   d. mentioned in a. and b.*

3. The new advance composites use
   a. stronger fabrics
   b. stronger resin matrix
   c. both above hence can not be repaired easily *
   d. above material does not pose any problem for repair

4. The greatest advantage to use composite material is
   a. high strength to weight ratio
   b. cost effective and vibration resistant
   c. it does not corrode like metal
   d. all above *

5. Modern composites utilises
   a. advanced materials
   b. advanced technological processes
   c. both above to obtain greater strength, less weight and wear resistance *
   d. the traditional linen and dope

6. Usually the composite materials are used to manufacture
   a. surface controls
   b. nose bullets and radomes
   c. under carriage doors and fairings
   d. all above *

7. Boeing 737 uses approximately 1500 pounds of composite materials which provides the weight saving of approximately
   a. 1500 pounds
   b. 1000 pounds
   c. 600 pounds *
   d. 500 pounds

8. Harrier (AV - 8B. was the first military aircraft with an all composite
   a. vertical stabilizer
   b. wing *
   c. horizontal stabilizer
   d. fuselage

9. When replacing aluminium structure with composites
   a. weight reduction is achieved ≈ 20% *
   b. tensile strength is increased by ≈ 30 %
   c. compression strength is increased by ≈ 30 %
   d. all above is obtained

10. In airbus aeroplanes the composite materials are used for
   a. radomes, nose landing gear doors and outer wing trailing edges
   b. surface controls, air brakes and spoilers
   c. main landing gear doors, thrust reversers and fan cowl.
   d. all above *

11. The re - enforced fiber provides to, composite structure
   a. primary strength *
   b. secondary strength
   c. bonding strength
   d. all above

12. There are five basic re - enforcing materials are used to make composite structures, i.e.
   a. fiber glass, aramid, carbon / graphite, boron and ceramic *
   b. fiber glass, aramid, thermoplastic, honey comb and mica
   c. glass cloth, cotton fabric, aramid, carbon and ceramic
   d. thermosetting plastic, mica, ceramic, boron and glass cloth

13. The fiber glass (glass cloth) made from small strands of molten silica glass and have two common types, i.e.
   a. Borosilicate glass (E - glass)
   b. Magnetia - alumina glass (S - glass)
   c. Mercury - Mica glass (S - glass)
   d. a. and b.*

14. Kevlar - 49 is the most widely used aramid fiber of high tensile strength. If compared to aluminium
   a. it is equillant
   b. four times higher *
   c. it is having double tensil strength
   d. it have six time tensile strength

15. The carbon / graphite fiber is very strong, stiff and is used for its rigid strength characteristics to make
   a. primary structural components
   b. ribs and skin surfaces of wing
   c. bulk heads
   d. usually all above *

16. Boron fibers
   a. are made by depositing boron on to a thin filament of tungsten
   b. have excellent compressive strength and stiffness
   c. are costly and hazardous to work
   d. have all above characteristics *

17. Ceramic fibbers composite structures
    a. retains its flexibility and strength upto 2200 °F
    b. are heat resistant and dissipate heat quickly
    c. are used to make tiles for space shuttle
    d. are credited with all above *

18. Hybrid composites are made by
    a. mixing various matrices
    b. mixing more then one re - enforcing agents
    c. either of above *
    d. none of the above

19. The strength of the re - enforcing material in a matrix is dependant on
    a. weave of material
    b. wetting process (matrix application)
    c. tensile strength of filament
    d. all above *

20. The tensile strength of composite will decrease with mixing of resin. Hence, to find the strength in a laminate of 50 % each of fiber and resin
    a. add the tensile strengths of fiber and resin and divide by two *
    b. add strengths of both and divide by four
    c. divide the tensile strength of fiber by three
    d. minus the strength of resin from the strength of fiber.

21. Polyester resin has been used with fiber glass but does not offer sufficient strength to fabricate primary structural members. Hence the newer matrix materials display
    a. improved stress distribution
    b. high heat resistance
    c. chemical resistance and durability
    d. all above characteristics *

22. Resin matrix consists of
    a. resin b. catalyst or hardener
    c. both above * d. none of the above

23. Resin matrix system are a type of plastic i.e. thermo plastic or thermosetting and are used to make
    a. structural composites
    b. non structural composites
    c. all types of composites *
    d. only composites for surface controls

24. Epoxy resin is a
    a. thermo plastic resin
    b. thermo setting resin *
    c. either of the above
    d. neither of the above

25. Epoxy resins have outstanding
    a. adhesion
    b. strength
    c. resistance to moisture and chemicals
    d. all above *

26. To make the desired matrix
    a. mix resin system properly
    b. resin is mixed by weight instead of volume
    c. mix resin and catalyst (hardener) before adding any filler
    d. follow as above *

27. Using excessive or lesser resin will make the composite structure weak. Hence, in advance composites, the fiber to resign ratio used is
    a. 50 : 50 b. 60 : 40 *
    c. 40 : 60 d. none of the above

28. Resins can be in the form of
    a. thinner for laminating
    b. adhesives for bonding
    c. both above *
    d. none of the above

29. The adhesives comes in the form of
    a. cans and cartridges b. plastic bags
    c. film and foaming * d. all above

30. 'Pre - pregs' fabrics are those
    a. which are already impregnated with resin system
    b. which are dipped in resin solution
    c. which are manufactured to eliminate mixing and application of resin
    d. as mentioned above *

31. Fillers are the materials which added to resins to control
    a. viscosity b. weight
    c. pot life d. all above *

32. Fillers can be in the forms of
    a. micro-balloons of plastic
    b. micro balloons of glass
    c. chopped fibbers and flex
    d. all above *

33. Metal matrix composites are under experiments by using chopped fiber and fiber strand with molten
    a. aluminium b. titanium
    c. steel d. all above *

34. Popular core structures are
    a. foams b. honey combs
    c. woods d. a. and b. are correct *

35. Honey comb stricture has a very high strength to weight ratio. Its core may be constructed of
    a. aluminium b. kevlar or nomex
    c. steel or carbon d. all above *

36. Honey comb is joined together with a
    a. foam adhesive *
    b. film adhesive
    c. cartridge adhesives
    d. none of the above

37. Foam cores for sandwich construction are available in different types depending up on the specific application, such as
 a. styro foam or urethane
 b. poly vinyl chloride (Prc.
 c. strux (cellulose acetate)
 d. all above *

38. The styrofoam is used only with
 a. polyester resin b. epoxy resin *
 c. thermo plastics d. any of the above

39. The styrofoam is cut to shape by
 a. ordinary knife b. hack saw
 c. hot wire cutter * d. none of the above

40. The urethane foam is used with
 a. polyester resin b. epoxy resin
 c. either of the above * d. none of the above

41. Since hazardous gas is created when subjecting urethane foam to heat, it is not to be cut to shape by
 a. knife b. scissors
 c. hack saw d. hot wire cutter *

42. Polyvinyl chloride is used with
 a. polyester resin b. thermoplastic
 c. epoxy resin d. both a. and c.*

43. PVC foam can be cut with
 a. knife b. hot wire cutter
 c. by both above * d. none of the above

44. Strux foam also known as cellular, cellulose acetate is used for
 a. ribs or other structural supports
 b. aircraft surface controls
 c. vertical and horizontal stabilizers
 d. all above *

45. For wood core structures the wood used are
 a. balsa wood
 b. laminations of hard woods
 c. either of the above *
 d. none of the above

46. For some composite constructions
 a. Balsa wood is bonded with high strength material
 b. laminations of hard wood are bonded with stronger laminates
 c. either of above can be adopted *
 d. woods are used singularly.

47. Finished composite structures are applied with heat and pressure for curing to accomplish :
 a. complete saturation of fiber material
 b. squeezing of excess resin and elimination of air pockets
 c. acceleration of curing process of the matrix
 d. all above *

48. In compression molding, re - enforced fabric is wetted with a matrix then
 a. laid into a female mold and male mold is used to form the shape
 b. it is cured by applying specific temperature for definite time
 c. both above operations are done in sequence *
 d. both above operations are done simultaneously

49. In compression molding method of composites, the mold is heated by
 a. circulating the hot oil through the mold
 b. electrical filament embodied in the mold
 c. putting the entire mold assembly into an oven
 d. any of the above method *

50. The vacuum bag technique can be used
 a. in combination with molds, wet lay up and auto clave curing
 b. to apply very uniform pressure to form complicated shapes
 c. to apply pressure for composite repairs
 d. for all above *

51. The filament winding method of composite manufacturing is adopted
 a. to make ordinary composites
 b. to make some of the strongest composites
 c. to make composites for entire fuselage, rotors and propellers
 d. as b. and c.*

52. Presently, to prevent weakening of the structure
 a. large repair pattern is approved on filament windings
 b. very few repairs have been approved *
 c. no repair is approved
 d. dents are permitted to be cut and repair

53. The wet lay up method of composite manufacturing is
 a. a less precise method
 b. a very complicated method
 c. mixing the matrix with fiber and laying over a surface
 d. as a. and c.*

54. Lightening protection in composites is provided by electrical bonding performed by
 a. weaving aluminium wire in the top layer of fabric
 b. laminating a aluminium screen under the top layer of fabric
 c. bonding a thin aluminium foil sheet to the outer layer of composite
 d. any of the above method *

55. After manufacturing a composite part, it is painted to seal the surface by
 a. plastic coating b. gel coat
 c. polyester resin d. any of the above *

56. Composite material is a blend of
    a. Two materials
    b. Three materials
    c. Four materials
    d. 2 or more components*

57. The strength and stiffness of fibre is usually________
    a. Less than matrix material
    b. Much greater than matrix material *
    c. Equal to matrix material
    d. None of the above.

58. Fibre filaments carry
    a. Compressive loads b. Shear loads
    c. Tensile loads * d. All of the above.

59. The major disadvantage of advanced composite materials in airplane construction is
    a. Relatively high cost *
    b. Relatively less durability
    c. Relatively high maintenance cost
    d. None of the above.

60. Sandwich structures fall under
    a. Fibre reinforced composites
    b. Laminar composites *
    c. Particulars composites.
    d. All of the above.

61. Composites can provide structures that are lighter than the conventional aluminium structures, designed to meet the same functional requirements, by
    a. 25-45% * b. 75-85%
    c. 5-15% d. 50-65%

62. Composite densities range from
    a. 1260 to 1820 kg/m^3 b. 0.045 to 0.065 lb/in^3
    c. 2800 to 3000 kg/m^3 d. Both (a) and (b) *

63. Unidirectional fibre composites have specific tensile strength (ratio of material strength to density)
    a. 2 to 4 times greater than that of steel and aluminium.
    b. 4 to 6 times greater than that of steel and aluminium.*
    c. 6 to 8 times greater than that of steel and aluminium.
    d. 8 to 10 times greater than that of steel and aluminium.

64. Fatigue endurance limit of composites may approach 60% of their
    a. Ultimate tensile strength *
    b. Ultimate compressive strength
    c. Shear stress
    d. Yield tensile strength

65. Advantages of composites are
    a. High strength or stiffness to weight ratio.
    b. Greater reliability
    c. High resistance to impact damage.
    d. All of the above *

66. Composite is described when two or more materials are combined to form
    a. much stronger structure *
    b. structure with the same strength
    c. weaker structure than has materials
    d. any of the above

67. The composite is composed of
    a. liquid matrix and solid re-inforcement *
    b. liquid re-inforcement and solid matrix
    c. matrix and re-inforcement in liquid states
    d. matrix and re-inforcement in solid states

68. Few composites consists of
    a. matrix b. re-inforcing agent
    c. core material d. all of the above *

69. A more contemprary example of composites is of
    a. dope and fabric aircraft b.mud and straw bricks
    c. both above * d. none of the above

70. Fabric aircraft skin is made stronger by matrix as
    a. nitrate dope b. butyrate dope
    c. either of above * d. none of the above

71. Dope and fabric aircraft are
    a. strong and simple
    b. cheep
    c. high performance aerobatic planes
    d. all of the above *

72. Second world war fighters and early airliners had fabric surface controls such as
    a. ailerons b. elevators
    c. rudders d. all of the above *

73. The technology of composites progressed with the introduction of
    a. butyrate dope b. fibre glass
    c. polyester resin d. all of the above *

74. In 1950s the fibre glass fabric impregnated with polyester resin was used for
    a. fairings b. radomes
    c. non structural parts d. all of the above *

75. Epoxy resins were introduced in
    a. 1940s b. 1950s *
    c. 1960s d. 1970s

76. To reduce the weight many metal parts have been replaced with fibre glass composites, such as
    a. wing tips b. tail cones
    c. radomes d. all of the above *

77. The Success of composites resulted in introduction on modern airliners. Boeing 747 have surfaces of fibre glass composites of more than
    a. 15000 sq.ft. b. 10000 sq.ft. *
    c. 25000 sq.ft. d. 5000 sq.ft.

78. Resurgence in the use of new composites occured due to
a. introduction of carbon/graphite re-inforcements
b. developments of chemistry of matrices
c. strong urge for strength/weight gains
d. all of the above *

79. Aviation composit technology has advanced to the point where it find enough use
a. in primary structure b. infuselage
c. inwings d. in all above *

80. The newer advanced composites are stronger and are repaired by
a. ordinary fibre glass techniques
b. special techniques for each type of composit
c. methods advised by manufacturer
d. as mentioned in b & d *

81. When aluminium parts are replaced with composite materials, the weight reduction is achieved
a. 5% b. 10%
c. 15% d. more than 20% *

82. By use of composites on aircraft structures
a. weight and cost is reduced
b. number of parts & fastners also reduced
c. excessive use & rivets and seams eliminated
d. all above is gained *

83. Composites
a. may be designed to be flexible
b. are non-corrosive and wear resistant
c. possess viberation resistance
d. are and possess as above *

84. Composites without developing metal fatigue can take
a. bending stressses b. twisting stresses
c. both above * d. none of the above

85. The strength of the composite depends upon the
a. type of re-inforcements
b. type of bonding material
c. process adopted to take specific stress
d. all of the above *

86. Presently the major user of composit material for aviation applications is
a. civil aviations
b. military aviations *
c. light aircraft producers
d. none of the above

87. Boron composites are
a. cheap b. expensive
c. dangerous d. as b & c *

88. Boron epoxy composites are used to make
a. stablizers for F-14 & 15 fighter a/c
b. re-inforced longeron on bomber a/c B-1B
c. both of above *
d. wings of F-14 & 15 aircraft

89. The weight saving achieved on F-14 aircraft by using boron composit is
a. ≈ 10% b. ≈ 15%
c. ≈ 22% * d. ≈ 19%

90. By using boron composit on F-15 aircraft, weight saving achieved is
a. ≈ 10% b. ≈ 19% *
c. ≈ 44% d. ≈ 15%

91. By using re-inforced composit longeron B-1B aircraft weight has been reduced by
a. ≈ 25% b. ≈ 44% *
c. ≈ 35% d. ≈ 26%

92. Grumman X-29 forward sweep wing aircraft to with stand stresses uses
a. carbon/graphite filament in complex pattern
b. 156 layers of fibers
c. laminated fibre layers running in different directions
d. carbon/graphite composites as above *

93. The objectives of the US army's advanced composit airframe program (ACAP) is to reduce
a. weight by 22%
b. cost by 17%
c. cost & weight by 30%
d. a and b *

94. The first military aircraft with full composit wing is
a. F-14 b. F-15
c. harrier * d. B-1B

95. The stealth homber B-2 aircraft frame and skin are made of
a. titanium
b. alclad
c. carbon/graphite fibre *
d. fabric fibre with epoxy resin

96. V-22 osprey, tilt rotor, turbo propellor aircraft consists of
a. carbon/graphite laminated airframe
b. fibre glass composite propellars
c. both above *
d. fabric fibre with epoxy resin

97. Lock needs airliner L-1011 aircraft uses 1300 pounds of woven fabric for
a. fairings and ailerons
b. vertical stablizer
c. leading edges of wing etc.
d. all of the above *

98. Boeing in the past, used composites for surface controls only, now for its newer applications it is using
a. carbon/graphite b. kevlar
c. hybrid mixture d. all of the above *

99. By using 1300 pounds if woven fabric on L-1011 aircraft weight reduction is achieved by
    a. 20% b. 28% *
    c. 10% d. 15%

100. Nomex® honey comb used firstly on
    a. Boeing * b. Airbus
    c. DC-10 d. all of the above

101. Boeing 757 uses on its primary control surfaces and spoiless the composites of
    a. graphite/epoxy * b. graphite/polyester
    c. fabric/butylene dope d. hybrid

102. Hybrid composites are on Boeing 757 to make
    a. a/c doors b. access panels
    c. cowlings and fairings d. all of the above *

103. By using composites on Boeing 757 weight saving have been achieved by
    a. 500 pounds b. 1000 pounds *
    c. 2000 pounds d. 1500 pounds

104. Boeing 737 uses composites of approximatly
    a. 1000 pounds b. 1500 pounds *
    c. 2000 pounds d. 2500 pounds

105. By using composites in Boeing 737, the weight saving is achieved by
    a. 400 pounds b. 600 pounds *
    c. 800 pounds d. 1000 pounds

106. Boeing 737 uses the composites of
    a. fibre glass b. graphite/kevlar
    c. hybrids of above d. all of the above *

107. In Boeing 737 aircraft composites are used for
    a. secondary flight control surfaces
    b. fairing and landing gear doors
    c. interior paneling
    d. all of the above *

108. Horizontal stabilizer of F-14 is made of boron composit by which
    a. 182 lbs weight reduced
    b. fatigue resistance increased
    c. strength equals to titanium
    d. all above have been achieved *

109. In Boeing 767 various constrictions with composites vary as per the locations and applications i.e.
    a. deck floor panels, radome and leading edge pannels are made if fibre glass re-inforced plastics
    b. under seat area the nomex core with fibre glass covering
    c. main aisles and galleys with dense nomex core
    d. as in a, b & c *

110. Airbus 300, 310 and 320 extensively uses
    a. nomex b. kevlar
    c. graphite d. all of the above *

111. The new Airbus models have vertical fin of
    a. carbon fibre * b. nomex
    c. fibre glass d. any of the above

112. Airbus 300-600 utilises composites on
    a. radome landing gear doors
    b. outer wing trailing edge
    c. Airbrakes, rudder & thrust reverser etc.
    d. all of the above *

113. On business jets composites are used on
    a. secondary structure b. flight control surfaces
    c. both above * d. none of the above

114. On business jets composites used are
    a. fibre glass b. carbon fibre
    c. kevlar d. all of the above *

115 In saab SF-340 business jet, nomex sandwitch structures are used on
    a. flap LE, TE
    b. flap core
    c. heat exchanger fairing
    d. all of the above *

116. The propellar blades of Saab SF 340 business jet is made of composites structure, fabricated with
    a. polyurethane core
    b. laminated carbon fibre spars
    c. fiberglan skin
    d. all of the above *

117. Sikorsky's S-76 helicopter uses composit with
    a. thermoset matrix b. kevlar sheet
    c. kevlar honey comb d. all above forms *

118. Composit percentage in total airframe of S-76 is about
    a. 50% b. 70%
    c. 60% * d. 80%

119. Main and tail rotors of S-76 helicopter considered as bearing less rotor are made of
    a. carbon fibre
    b. fiberglass with honey comb core *
    c. kevlar
    d. nomex

120. In S-76 helicopter kevlar 49 is used for airframe components and saves weight by
    a. 40% b. 20%
    c. 30% * d. 50%

121. Sikorsky UH-60 black hawk helicopter uses kevlar/carbon of about
    a. 300 lbs b. 400 lbs *
    c. 500 lbs d. 600 lbs

122. Sikorsky UH-60 uses 400 lbs of
    a. carbon/kevlor * b. nomex
    c. fiberglass d. woven fabric

123. UH-60 helicopter consists of
   a. composite rear fuselage
   b. carbon main rotor blades
   c. composite rotor head
   d. all of the above *

124. The bell helicopter model 222 is made of
   a. fibre glass b. nomex *
   c. either of above d. none of the above

125. By refitting CH-53 super stallion helicopter with composites the cost reduction is by
   a. 30% b. 40% *
   c. 50% d. 15%

126. By using the composite materials in CH-53 super stallian helicopter the fasteners eliminated of the order of
   a. 5000 b. 8000
   c. 10000 * d. 6000

■■■

CHAPTER - 76
RE-INFORCING FIBERS

1. The re-inforcing fiber gives to composite the
   a. primary strength *
   b. secondary strength
   c. bonding strength
   d. all of the above

2. There are five common type of re-inforcing fibers i.e.
   a. glass cloth, aramid, carbon/nomex and ceramic
   b. glass fiber, nomex, boron, graphite and aramid
   c. kevlar, epoxy, nomex, aramid and carbon
   d. fiber glass, aramid, carbon/graphite, boron & ceramic *

3. Basic re-inforcing fibers can be used
   a. in combination with other
   b. as sandwitch structure
   c. with various matrix materials
   d. all of the above *

4. Fiber glass is made from
   a. fine tungesten woven wires
   b. strands of molten silica glass *
   c. woven fabric
   d. none of the above

5. Fiber glass is
   a. weaved differently as per application
   b. of low cost and havier comparatively
   c. lesser strong then other fibers
   d. as mentioned in a, b and c *

6. In past fiber glass with polyester resin were used for non-structural applications. The composites were
   a. heavy and brittle * b. hard and tough
   c. stiff and formable d. light and strong

7. Fiber glass has been banefitted as re-inforcing fiber with development of
   a. matrix formulas * b. quality of glass cloth
   c. curing techniques d. all of the above

8. Most common type of fiber glass used for re-inforcement is
   a. S-glass b. E-glass *
   c. both above d. none of above

9. Where very high tensile strength fiberglass is needed then
   a. E-glass is selected
   b. S-glass is opted *
   c. either of the above can be used
   d. none of the above is suitable

10. Mark the correct statement
    a. E-glass is known as electric glass due to its high resistivity
    b. S-glass is a magnesia-alumina-silicate glass
    c. S-glass possess very high tensile strength
    d. all above statements are correct *

11. Using some clever method to combine fiber glass with other more expensive fiber,
    a. hybrid material can be produced
    b. lower cost material can be produced
    c. lower cost high strength material is produced
    d. a material as per a and c is obtained *

12. Aramid fiber is of
    a. white colour b. yellow colour *
    c. brown colour d. ash colour

13. Aramid possess the characteristics of
    a. light weight
    b. excellent tensile strength
    c. remarkable flexibility
    d. all of the above *

14. Mark the incorrect statement
    a. aromatic polymide fibers are known as aramid
    b. kevlar is registered trade mark for aramid
    c. nomex is the registered trade mark for aramid *
    d. kevlar streches a great deal before it breaks

15. Kevlar possess, in comparasion with alloyed aluminium the tensile strength of :
    a. two timeshigh
    b. four times high *
    c. six times high
    d. one and half time high

16. The aircraft structural grade of kevlar fiber is known as
    a. kevlar 49 * b. kevlar 29
    c. kevlar 129 d. none of above

17. Kevlar 29 is used on
    a. aircraft structure
    b. marine applications *
    c. bullet proof equipment
    d. none of the above

18. Kevlar 129 is used for
    a. boats b. aircraft structure
    c. bullet proof jackets * d. all of the above

19. Mark the correct statement
    a. bullet proof kevlar have different weave then kevlar 29
    b. matrix is omited to make bullet proof jackets
    c. matrix tends to make a part more brittle
    d. all above statements are correct *

20. Aramid is an ideal material for use in aircraft parts which are subjected to
    a. high stress   b. viberation
    c. saline environment   d. as a and b *

21. To prevent the fatigue and stress cracks the aramid is used to manufacture
    a. rotors of helicopters   b. hubs of rotors
    c. both above *   d. none of the above

22. Aramid composites are
    a. machinable   b. easy to drill
    c. problematic to drill *   d. as a & b

23. After drilling aramid fiber becomes fuzzy around fastener's hole which causes
    a. no problem
    b. act as wick and absorb moisture *
    c. hardness to fix fastener
    d. crack in sheets

24. In case of strands of aramid absorbs moisture in the form of water, oil, fuel or hydraulic fluid, it may
    a. not cause any problem with the fiber
    b. cause deterioration of matrix system
    c. cause seperation of laminates
    d. be as mentioned in b and c *

25. Even a slight amount of moisture will prevent aramid from bonding property, hence aramid is to be repaired with
    a. graphite   b. boron
    c. fiber glass *   d. any of the above

26. Mark the incorrect statement
    a. aramid exibits great tensile strength
    b. aramid exibits great compressive strength *
    c. aramid does not have as much compressive strength
    d. aramid does not possess the a & b qualities

27. Carbon/graphite fibers are described as
    a. carbon in British system
    b. graphite in American system
    c. carbon #584 and graphite #584, both are the same
    d. all of the above *

28. Carbon/graphite fiber is
    a. very strong and stiff
    b. used for primary aircraft structure
    c. as above *
    d. hard and brittle

29. Carbon/graphite fiber is used
    a. for ribs and wing skins
    b. to design large aircraft with lesser bulk heads
    c. to design larger aircraft with lesser ribs and stingers
    d. for all above purposes *

30. Carbon/graphite posses higher compressive strength than
    a. kevlar   b. fiber glass
    c. both above *   d. none of the above

31. Carbon graphite is more brittle than
    a. kevlar   b. fiber glass
    c. both above *   d. none of the above

32. Carbon/graphite fiber is more prone to corrosion when it comes into contect of
    a. brass   b. aluminium *
    c. bronze   d. all of the above

33. In case carbon/graphite fiber is bonded to aluminium then a layer of _____________ is placed in between both
    a. fiber glass *   b. boron
    c. ceramic   d. any of the above

34. In case aluminium is bonded with carbon/graphite fiber it is to be
    a. anodised   b. primed
    c. painted   d. done with all above *

35. Boron fibers are made by depositing boron elements on a thin filament of
    a. silica glass   b. tungesten *
    b. copper   d. none of the above

36. Boron deposited tungesten filament is of about
    a. 0.04 inch dia   b. 0.4 inch dia
    c. 0.004 inch dia *   d. 0.0004 inch dia

37. Boron possess excessive
    a. compressive strength   b. tensile strength
    c. hardness *   d. all above

38. Boron is not commonly used on civil aviation because
    a. it is hazardous to work with
    b. it is expensive
    c. of both above reasons *
    d. it smells very badly

39. Civil aviation manufactures for want of strength and stiffness are utilizing hybrid composites of
    a. aramid   b. carbon/graphite
    c. both above *   d. boron

40. Ceramic fibers are used where need arises for
    a. high strength
    b. greater stiffness
    c. high temperature resistance *
    d. all of the above

41. The ceramic composites retain most of the strength and flexibility at temperature upto
    a. 1500^0 F
    b. 2200^0 F *
    c. 2500^0 F
    d. 2700^0 F

42. Ceramic composites are used where
    a. heat insulation is required
    b. heat resistance is required
    c. heat dissipation is required
    d. both as b and c is required *

43. Tiles of space shuttle are made from
    a. boron composites
    b. aramid composites
    c. special ceramic composites *
    d. all of the above

44. Ceramic composites are offenly used
    a. for fire wall
    b. with metal matrix
    c. with polyester matrix
    d. both as a and b *

45. Presently the most widely used re-inforced fiber is
    a. carbon graphite *
    b. aramid
    c. boron
    d. ceramic

46. Strength of the re-inforcing material in matrix is dependent on
    a. weave of the material
    b. filament tensile strength
    c. design of the part
    d. all of the above *

47. Soundness of composites depends upon the
    a. quality of fiber
    b. wetting process
    c. matrix adapted
    d. all of the above *

48. Tensile strength of raw fabric used for aviation composit material with resin, its
    a. tensile strength is increased
    b. tensile strength remains same
    c. tensile strength reduces *
    d. flexibility increases

49. To find the strength in a laminate of 50-50 fiber and resin
    a. sum of their tensile strength is divided by two *
    b. sum of their weight is divided by two
    c. sum of their volume is divided by two
    d. sum of their tensile strength is divided by four

50. The strength and stiffness of composit build up depends on the
    a. orientation of plies to the load direction
    b. selective placement of fiber
    c. selective use of matrix system
    d. all of the above *

51. When helicopter rotor blades are fabricated of composites the vectors of strength might be referred to as
    a. zero degree plies for axial loads
    b. 45 degree plies to react to shear vectors
    c. 90 degree plies to take side loads
    d. mentioned in a, b and c *

52. In flight, wings tend to bend upwards, if made of composites to reduce the bending tendency
    a. have a layer with fibers at 30 degrees
    b. have a layer with fibers at 45 degrees *
    c. have a layer with fibers at 60 degrees
    d. have a layer with fibers at 90 degrees

53. To reduce th tendency of composit wing twisting in flight the layers with fiber are oriented at
    a. 30 degrees
    b. 45 degrees
    c. 90 degrees *
    d. 60 degrees

54. The strength of the fiber are ___________ to the direction that the thread runs
    a. parallel *
    b. perpendicular
    c. 45 degrees
    d. 60 degrees

55. On X-29 forward swept experimental jet fighter for multi-directional loads on the wings, the wings are produced with
    a. 156 layers of carbon/graphite in unidirection
    b. using multidirectional fiber orientation
    c. combination of both above orientation *
    d. none of the above techniques

56. The warp of a fabric is
    a. the threads run across the length
    b. the threads run across the width
    c. designated at 0 degree
    d. know as a and c *

57. The warp of the fabric contains ___________ threads woven then fill
    a. more *
    b. less
    c. double
    d. half

58. The fiber material is ___________ in warp direction
    a. stronger *
    b. weaker
    c. as strong as fill
    d. very thin

59. Weft threads are those in fiber, which run __________ to the warp fiber
    a. perpendicular *
    b. 30 degree
    c. 45 degree
    d. 60 degree

60. Selvage edge is
    a. a tightly woven edge to prevent from raveling
    b. edge run in parrallel to the warp threads
    c. removed before any fabrication
    d. as mentioned in a, b & c *

61. Bias is
    a. at 45 degree angle to warpthreads *
    b. at 60 degree angle to warpthreads
    c. at perpendicular to warp
    d. at parrallel to warp

62. Their are fabrics with different style, i.e.
    a. unidirectional
    b. bidirectional/ multidirectional
    c. mats
    d. all above *

63. In unidirectional fabrics
   a. all major fibers of warp and weft weaved with equa threads
   b. all major fibers run in one direction *
   c. all fibers run in multidirectional
   d. are as all above

64. Unidirectional fabrics are as
   a. wooven
   b. not wooven in actual terms
   c. major strends are just held in position by a single thread
   d. mentioned in b & c *

65. Tapes are
   a. unidirectional
   b. made of carbon/graphite
   c. used for repair
   d. as said above *

66. Bidirectional or multidirectional fabrics threads are wooven togather in
   a. single direction
   b. two or more directions *
   c. chopped forms
   d. any of the above methods

67. In bidirectional/multidirectional fabrics, the threads are
   a. more in warp than weft *
   b. less in warp then weft
   c. equal in warp & weft
   d. all above is opted as required

68. The mats are
   a. compressed, chopped fibers
   b. the special fabric weaved in multidirections
   c. used in combination of unidirectional layer of fabric
   d. as mentioned in a & b *

69. A mat is usually not
   a. as strong as unidirectional fabric
   b. used in repair work
   c. included in the types of fabric
   d. as said in a & c *

70. Comparing to unidirectional material, the fabrics are more resistant to
   a. fiber breakout b. de-lamination
   c. damage d. all above *

71. Satin weave (eight hardness) is usually adopted for
   a. fabricating the new parts
   b. repair work
   c. core lamination *
   d. all above

72. The 7781 typical style of satin weave has
   a. 50 yarns warp and fill b. 60 yarns warp and fill
   c. 75 yarns warp and fill d. none of the above *

73. The 1581 typical style of satin weave has
   a. 75 yarns warp and fill
   b. 100 yarns warp and fill
   c. 125 yarns warp and fill *
   d. 150 yarns warp and fill

74. The 181 typical style of satin weave has
   a. 75 yarns warp and fill *
   b. 150 yarns warp and fill
   c. 225 yarns warp and fill
   d. 250 yarns warp and fill

75. Four harness weave style 120 has threads for
   a. 60 - 58 warp & fill b. 60 - 55 warp & fill
   c. 65 - 55 warp & fill d. none of the above *

76. Style 120 has
   a. 75 yarns warp & fill * b. 150 yarns warp & fill
   c. 225 yarns warp & fill d. 450 yarns warp & fill

77. Eight harness satin weave have the thickness of
   a. 0.009" b. 0.004" *
   c. 0.008" d. none of the above

78. Eight harness satin weave have
   a. 57 warp and 54 fill * b. 60 warp and 58 fill
   c. 65 warp and 55 fill d. none of the above

79. Hybrid composites are
   a. the combinations of different types of fibers
   b. made to obtain greater strength
   c. made sometimes to reduce cost
   d. as all above *

80. In aviation, presently hybrid composites used are
   a. intraply hybrid b. interply hybrid
   c. selective placement d. as all above *

81. Intraply hybrids are made from the material that is woven from
   a. two or more different type of fibers *
   b. single fiber threads
   c. laminated threads
   d. none of the above

82. Interply hybrid uses
   a. fabrics woven from different fibers
   b. different fibers laminated togather *
   c. selective placement
   d. any of the above

83. Fibers may be selectively placed
   a. to give greater strength
   b. for better flexibility
   c. to reduce cost
   d. for all above reasons *

84. For selective placements, the fiber is selected to meet specific requirement, i.e.
   a. carbon/graphite for stiffness
   b. fiberglass for flexibility
   c. fiberglass for cost reduction
   d. all above *

85. Mark the wrong statement
    a. carbon/graphite is costly fiber
    b. fiber glass is the costly fiber *
    c. fiber glass is a cheaper fiber
    d. for flexibility fiber glass is prefered

86. Bulk or blown fibre is used
    a. only for insulation
    b. for insulation and allied application *
    c. for making plates
    d. none.

87. Which process provide fibre glass mat products directly from glassy melts.
    a. MAT * b. AMT
    c. TAM d. TMA.

88. The temperature end point limitations for microfibres are
    a. 482°C * b. 562°C
    c. 655°C d. 392°C

89. The very first fibre glass bushing contained
    a. 51 holes * b. 41holes
    c. 61 holes d. 31 holes.

90. The commercial designations of fibre glass
    a. Glass King b. Glass Cloth *
    c. any of Above d. None.

91. Which of the following melting system is advantageous
    a. cupola b. glass tank furnace *
    c. electric furnace d. all are same.

92. Which of these , the latest in the line of improvements in bulkwool fibre production
    a. steam -blown b. flame attenuation
    c. spinning d. rotary process. *

93. Which of the following process does not required additional fuel for reheating the marbles
    a. Direct -melt * b. Indirect melt
    c. Any of the above d. None.

94. Which of the following one is the major applications of blown fibre glass
    a. Acoustical insulation for building
    b. Pipe & air handling insulation
    c. both of the above *
    d. none of the above

95. Flexural strength of carbon composites
    a. 10 - 120 MPa * b. 100-200 MPa
    c. 2 -5 MPa d. none.

96. Flexural modulus of carbon composites is upto
    a. 14 GPa * b. 5 GPa
    c. 25 GPa d. 35 Gpa

97. Electrical resistivity of carbon composites
    a. 10^{-6} - 10^{-4} * b. 10^{6} -10^{8}
    c. 10^{-4} - 10^{-2} d. none

98. Thermal conductivity of carbon composites
    a. .05 - 0.4 $Wm^{-1}k^{-1}$ * b. .2 - .25 $Wm^{-1}k^{-1}$
    c. .25 -0.45 $Wm^{-1}k^{-1}$ d. none

99. Co-efficient of thermal Expansion(CTE) of carbon composites
    a. 1-10×$10^{-6}k^{-1}$ * b. 1-10×$10^{-7}k^{-1}$
    c. 1- 10×$10^{-3}k^{-1}$ d. none

100. Density (gcm^{-3}) of E-glass is
    a. 2.1 * b. 3.1
    c. 4.1 d 5.1

101. Density (gcm^{-3}) of IM Carbon is
    a. 1.5 * b. 1.7
    c. 2.5 d. .5

102. Density (gcm^{-3}) of HM carbon is
    a. 1.6 * b. 2.6
    c. .6 d. 3.6

103. Density (gcm^{-3}) of aramid is
    a. 1.2 b. 1.4
    c. 2.4 * d. 3.4

104. Density (gcm^{-3}) of steel is
    a. 7.9 b. 7.8 *
    c. 6.8 d. 7.0

105. Density (gcm^{-3}) of aluminium is
    a. 2.8 * b. 3.8
    c. 4.8 d. 5.8

106. Density of titanium is
    a. 3.0 b. 2.0 *
    c. 4.0 d. 5.0

107. Which of the following metals have higher density
    a. steel * b. aluminium
    c. titanium d. none

108. Which of the following composites have higher density
    a. E-glass * b. IM carbon
    c. HM carbon d. Aramid

109. Tensile strength (GPa) of E-glass is
    a. 1.1 * b. 2.1
    c. 3.1 d. 4.6

110. Tensile strength (GPa) of IM carbon is
    a. 1.6 b. 2.6 *
    c. 3.6 d. 4.6

111. Tensile strength of HM carbon is
    a. 0.6 b. 1.6 *
    c. 2.6 d. 3.6

112. Tensile strength of steel is
    a. 1.9 b. 1.8
    c. 1.3 * d. 2.3

113. Tensile strength of aluminium
a. 0.3 * b. 0.6
c. 0.7 d. 0.8

114. Which of the following composites have higher tensile strength
a. E-glass b. IM carbon *
c. HM carbon d. Aramid

115. Which of the following metals have higher density
a. steel * b. aluminium
c. titanium d. none

116. Which of the following metals have higher tensile strength (GPa)
a. steel * b. aluminium
c. titanium d. none

117. Young's modulus (GPa) for steel is
a. 100 b. 200 *
c. 300 d. 400

118. Which of the following composites have higher Young's modulus
a. E-glass b. IM carbon
c. HM carbon * d. Aramid

119. Young's modulus(GPa) for E-glass is *
a. 55 b. 45 *
c. 65 d. 35

120. Young's modulus for aluminium is
a. 63 b. 73 *
c. 83 d. 93

121. Young's modulus(GPa) of titanium is
a. 100 * b. 200
c. 300 d. 50

122. Which of the following metals have higher Young's modulus
a. steel * b. aluminium
c. titanium d. none

123. The first recorded purposeful transformation of cellulose to carbon fibres was by
a. Thomas Edison * b. Thomas Dhillon
c. Thomas Kattrick d. Thomas Cruck

124. The fibre modulus increases with increase in heat treatment temperature from
a. 500°C -1000°C b. 1000°C -3000°C *
c. 1500°C -2000°C d. 200°C -900°C

125. PAN structure may be stabilised by a process
a. Oxidation * b. Deoxidation
c. any of the above d. none

126. Which of the following country first developed carbon-carbon brake material
a. India b. U.S.A. *
c. Japan d. China

127. Which types of brakes are used in air craft
a. multiple disc brakes of rotors *
b. two discs brakes of rotors
c. single disc brakes of rotors
d. none

128. The brake discs are required to
a. Provide frictional torque to stop the aircraft
b. Serve as a heat sink to absorb the heat generated during the braking action
c. act as a structural component
d. all of the above *

129. The binary advantages of carbon-carbon composites are
a. Heat capacity which is 2.5 times greater than that of steel
b. high strength at elevated temperature almost twice that of steel
c. 40% saving in weight compared to metal brakes
d. All the above *

130. Composites used for braking are
a. Carbon fabric laminates
b. Semi random chopped carbon fibres
c. laminated carbon fibres
d. All of the above *

131. Hitco brakes are made from
a. carbon
b. carbon-carbon composites
c. phenolic resin *
d. impregnated carbon braking

132. The major advantage of the carbon-carbon braking materials are
a. light weight
b. excellent thermomechanical performance
c. inertness
d. all of the above *

133. Necessary criteria for preferred fibre orientation
a. To conduct heat away from the friction surface & into the body of disc
b. To conduct heat radially
c. To withstand shear forces at the drive slot
d. To minimize the effect of drive slot
e. all of the above *

134. On an average a rocket motor burns for around
a. 50s b. 40s
c. 30s * d. 25s

135. Dense carbon is used for an exit nozzle material because of its ____________ ablation resistance
a. superior * b. inferior
c. poor d. none

136. Carbon- carbon composites were restricted to use in
a. aerospace
b. military application
c. aerospace & military application *
d. none

137. Refurbished carbon-carbon brakes discs being indigenously developed by
a. CCTW * b. TTCW
c. TCWC d. TWCC

138. Developing agency of carbon -carbon brake discs situated at
a. Hyderabad * b. New Delhi
c. Chennai d. kolkata

139. Isotropic pitch based carbon fibres have tensile strength(GPa)
a. 1.0 * b. 2.0
c. 0.5 d. 3.0

140. Isotropic pitch based carbon fibres have tensile modulus
a. 21Gpa b. 31GPa
c. 41GPa * d. 51GPa

141. Electrical resistivity ($\Omega - m$)of isotropic pitch based carbon fibres
a. 10 b. 20 *
c. 30 d. 40

142. Cokes consists of
a. Graphitic carbon
b. Non graphitic carbon *
c. Both type of carbon
d. none

143. A green coke is obtained at temperature
a. Below 400°C b. Below 500°C
c. Below 600°C * d. Below 600°k

144. Low modulus commercial quality fibres having modulus between
a. 200-250 GPa b. 150-200GPa
c. 250-300GPa * d. 190-220GPa

145. Intermediate modulus fibres having tenstile modulous between
a. 150-200GPa b. 200-250GPa *
c. 100-150 GPa d. 250-300GPa

146. High modulus fibres having tensile modulus between
a. 360-400 GPa * b. 300-350 GPa
c. 200-250 GPa d. 250-300 GPa

147. Which of the following one is the prominent manufactureres of carbon fibre products
a. Amoco b. Hercules
c. Tonen d. All of the above *

148. Which of the following one is the prominent manufactureres of carbon fibre products
a. Mitubishi b. Toray
c. Tonen d. All of the above *

149. Which percentage of fibres mass is listed as decomposition products
a. 20-30% b. 30-40% *
c. 50-60% d. 40-70%

150. The decomposition product of fibres mass are
a. H_2O b. CO
c. CO_2 d. all of the above *

151. Fibre mass is lost during
a. oxidation * b. deoxidation
c. a &b d. none

152. The carbonisation step usually carried out at
a. 1000°C b. 1500°C *
c. 2500°C d. 3000°C

153. The yield after carbonisation is typically__________of the original polymer weight
a. 20 -25% * b. 30-35%
c. 40-45% d. 10-15%

154. Carbonisation is carried out between
a. 500°C-1000°C b. 1000°C-1500°C *
c. 2000°C-2500°C d. 2500°C-3500°C

155. Braiding is a simple ___________process
a. textile * b. mechanical
c. agriculture d. none

156. Metallurgical coke is produced by the carbonisation of coals or coal blends at temperature upto
a. 1000°C b. 2000°C
c. 1500°C d. 1100°C *

157. Pitches are derived from
a. organic precursors * b. inorganic precursors
c. both a&b d. none

158. Pitches are derived at temperature
a. below 400°C * b. below 200°C
c. below 600°C d. below 250°C

159. Volatile matter is released throughout the
a. carbonisation process *
b. oxidation process
c. deoxidation process
d. none

160. Which of the following fibres product have higher density
a. thornel 75 b. T300
c. P55 * d. P100

161. Which of the following fibres product have higher
a. thornel 75 b. T300
c. P55 * d. P100

162. Which of the following fibres product have higher tensile modulus
a. thornel 75 b. T300
c. P55 * d. P100

163. Which of the following fibres product have higher strain to failure
a. thornel 75 b. T300
c. P55 * d. P100

164. Which of the following fibres product have higher density
a. AS-4 b. IM-6
c. IM-7 d. UHMS *

165. Which of the following fibres product have higher tensile strength
a. AS-4 b. IM-6
c. IM-7 d. UHMS *

166. Which of the following fibres product have higher tensile modulus
a. AS-4 b. IM-6
c. IM-7 d. UHMS *

167. Which of the following fibres product have higher strain to failure
a. AS-4 b. IM-6
c. IM-7 d. UHMS *

168. Which of the following fibres product have higher density
a. T300 b. T800H
c. T1000G d. T1000 *

169. Which of the following fibres product have higher tenstile strength
a. T300 b. T800H
c. T1000G d. T1000 *

170. Which of the following fibres product have higher tenstile modulus
a. T300 b. T800H
c. T1000G d. T1000 *

171. Which of the following fibres product have higher strain to failure
a. T300 b. T800H
c. T1000G d. T1000 *

172. Which of the following fibres product have higher density
a. M60J * b. M55J
c. M46J d. M40

173. Which of the following fibres product have higher tenstile strength
a. M60J * b. M55J
c. M46J d. M40

174. Which of the following fibres product have higher tensile modulus
a. M60J * b. M55J
c. M46J d. M40

175. Which of the following fibres product have higher strain to failure
a. M60J * b. M55J
c. M46J d. M40

176. Density of the fibre products by the Korean are
a. 1.8 * b. 2.1
c. 2.4 d. 2.8

177. Which of the following fibres product have higher tensile strength
a. steel * b. aluminium
c. titanium d. aramid

178. The two important and most valuable forms of carbon are
a. diamond b. graphite
c. both a. & b. * d. none

179. 'Adamas' is the greek name of
a. carbon b. graphite
c. diamond * d. none

180. The diamond derives from
a. adamas * b. damas
c. mado d. dasma

181. Which of the following has ranked as the leader among the precious stones for centuries
a. carbon b. graphite
c. diamond * d. gold

182. What percentage of mined diamond becomes jewels
a. approx. 50% b. less than 25% *
c. less than 75% d. approx. 10%

183. The material used for cutting tools for machine fabrication, abrasive wheels, polishing media etc. is
a. graphite b. iron
c. diamond * d. gold

184. Which of the following is very soft material
a. diamond b. graphite *
c. gold d. iron

185. Which of the following has remarkable resistance to chemical attack
a. diamond b. graphite *
c. iron d. bronze

186. Graphite a ------------ form of carbon
a. monomorphic * b. polymorphic
c. dimorphic d. tetramorphic

187. Graphite consists of ---------------- layered structure
a. tetragonal * b. hexagonal
c. diagonal d. pentagonal

188. The bond exist in the graphite is
a. ionic bond b. covalent bond *
c. vanderirah d. none

189. The following are the properties of the graphite
a. Chemical inertness
b. high electrical conductivity
c. stiffness and temperature stability
d. all the above *

190. The raw material for graphite are / is
a. carbon black particle b. tar *
c. pitch d. resins
e. all of the above

191. Graphite is formed at an temparature of
a. 1500 °C b. 500 °C
c. 2500 °C * d. 3500 °C

192. In the structure of graphite, each carbon atom has ------------- nearest neighbour carbon atom
a. one b. two
c. three * d. four

193. Diamond has a ---------------- framework structure
a. two dimensional
b. three dimensional *
c. one dimensional
d. dimension less

194. Colour of graphite in earthy material is
a. red b. black *
c. blue d. green

195. Which of the following is a conductor of electricity
a. diamond b. graphite *
c. carbon d. none

196. Which of the following are the main forms of graphite
a. natural graphite b. pyrolytic graphite
c. artificial graphite d. all the above *

197. The name of graphite was given by
a. Scheel b. Michel
c. Werner * d. Kelvin

198. The nature and identity of Graphite were first identified by
a. Scheel * b. Michel
c. Werner d. Kelvin

199. The name Graphite was first given in
a. 1789 * b. 1898
c. 1889 d. 1979

200. The nature of graphite were first identified by Scheel in
a. 1742 - 1786 * b. 1842 - 1886
c. 1742 - 1743 d. 1843 - 1847

201. Graphite differs from the diamond by the following properties
a. colour b. hardness
c. both a. & b. * d. none

202. Specific gravity of charcoal is
a. 1.3 to 1.9 * b. 1.4 to 2.1
c. 2.1 to 2.7 d. 2.3 to 2.9

203. Specific gravity of graphite is
a. 2.1 to 2.3 * b. 2.3 to 2.6
c. 2.7 to 3.1 d. 2.5 to 2.7

204. Specific gravity of diamond is
a. 3.8 b. 3.5 *
c. 3.2 d. 2.3

205. Which of the following form of carbon has lowest specific gravity
a. charcoal * b. graphite
c. diamond d. all the above .

206. Which of the following form of carbon has highest specific gravity
a. charcoal b. graphite
c. diamond * d. tar

207. Which of the following material are more soft
a. graphite * b. talc
c. carbon d. charcoal

208. Annealed copper has a specific resistivity of
a. 0.679 $\mu\Omega$ * b. 0.579 $\mu\Omega$
c. 0.479$\mu\Omega$ d. 0.349$\mu\Omega$

209. Specific resistivity of iron is
a. 0.294 b. 0.394 *
c. 0.494 d. 0.594

210. Specific resistivity of nickel chromium alloy is
a. 39.4 * b. 49.4
c. 29.4 d. 19.4

211. Specific resistivity of natural graphite is
a. 35 - 40 * b. 40 - 45
c. 25 - 45 d. 25 - 30

212. Specific resistivity of amorphous carbon is
a. 140 b. 150 *
c. 50 d. 100

213. Which of the following material have highest resistivity
a. iron
b. natural graphite
c. amorphous carbon *
d. nickel chromium alloy

200. The nature of graphite were first identified by Scheel in
a. 1742 - 1786 * b. 1842 - 1886
c. 1742 - 1743 d. 1843 - 1847

201. Graphite differs from the diamond by the following properties
a. colour b. hardness
c. both a. & b. * d. none

214. Which of the following material have lowest resistivity
a. iron *
b. natural graphite
c. amorphous carbon
d. nickel chromium alloy

215. Which of the following is a good conductor of heat and electricity
a. graphite * b. diamond
c. carbon d. tar

216. Graphite is -------------
a. opaque * b. hard
c. transparent d. non conducting

217. Graphite is ---------------- by dry chlorine gas
a. affected b. not affected *
c. partially affected d. any of the above

218. Which of the following has remarkable resistance to weathering influence
a. graphite * b. charcoal
c. tar d. iron

219. The impurities exist in natural graphite are
a. mica b. calcite
c. auartz d. feldspan
e. all the above *

220. Fresh unaltered flake ores contain ------------- of graphite
a. 10 - 30 % * b. 20 - 40%
c. 30 - 70% d. 35 - 50%

221. Which of the following insulator can be used above 250 ^{0}C
a. mica * b. paper
c. glass d. porcelain

222. Which of the following is some what the same form, hardness and toughness as does graphite
a. mica * b. paper
c. glass d. porcelain

223. The crude ore consist of ------------ graphite
a. 60 - 70% * b. 50 - 60%
c. 40 - 50% d. 50 - 80%

224. Amorphous graphite is found in the form of ---------
a. large particles b. minute particles *
c. inquid d. solid

225. Metamorphosed coal seams contains ---------- graphite carbon
a. 80 - 85% * b. 70 - 80%
c. 80 - 75% d. 50 - 65%

226. Which of the following graphite forms after thermal decomposition
a. crystalline graphite b. amorphous graphite
c. pyrolitic graphite * d. artificial graphite.

227. During formation of pyrolitic graphite density of graphite deposited at 1700 ^oC is
a. 1.149 g / cc * b. 1.189 g / cc
c. 1.249 g / cc d. 1.439 gm / cc

228. During formation of pyrolitic graphite density of graphite deposited at 2100 ^oC is
a. 2.22 g /cc * b. 2.32 g /cc
c. 3.24 g / cc d. 3.22 g/ cc

229. The normal density of pyrolitic graphite is
a. 1.7 g / cc b. 2.7 g /cc *
c. 3.7 g / cc d. 0.7 g /cc

230. Thermal conductivity of pyrolitic graphite is
a. 0.08 watt / cm^{-1} /^{0} C^{-1} *
b. 0.09 watt / cm^{-1} /^{0} C^{-1}
c. 0.07 watt / cm^{-1} /^{0} C^{-1}
d. 0.06 watt / cm^{-1} /^{0} C^{-1}

231. For pyrolitic graphite the rate of decomposition is
a. 460 - 500 ^oC b. 780 - 1000 ^oC *
c. 500 - 500 ^oC d. none

232. A series of massive coherent, deposits of carbon may be produced by the pyrolysis of hydrocarbons on rods of graphite heated to temparatures between
a. 1600 - 2100 ^oC * b. 1500 - 2000 ^oC
c. 1000 - 1500 ^oC d. 500 - 1000 ^oC

233. In pyrolitic graphite the deposited carbons have a structure of --------------- layer planes of carbon atoms
a. diagonal b. hexagonal *
c. tetragonal d. pentagonal

234. The electrical and thermal conductivities of the deposited carbons are ---------------- dependent on the temparature of deposition]
a. not b. strongly *
c. partially d. mostly

235. The ultimate textile strength of pyrolitic graphite is ---------- of that commercial pitch coke graphite
a. more b. five times
c. ten times * d. lower

236. At which temparature material (graphite) behaves like a single crystal
a. 2900 °C * b. 2700°C
c. 2500 °C d. 2300 °C

237. The ductility of pyrolitic graphite can be increased by
a. mixing with 1% boron *
b. cannot be increased
c. mixing with 1% SiO_2

238. Which of the following graphite have an improved mechanical strength
a. pyrolitic graphite
b. boron pyrolitic graphite *
c. amorphous graphite
d. none.

239. Pyrolitic graphite containing the following intertitial metals
a. boron b. tungsten
c. tantalum d. niobium
e. all the above *

240. Apparent density of which of the extruded graphite is higher
a. fine grain stock maximum particle size 0.015” *
b. medium grain stock maximum particle size 0.12”
c. coarse grain stock maximum particle size 0.50”
d. all have same

241. Apparent density of which of the extruded graphite is lower
a. fine grain stock maximum particle size 0.015”
b. medium grain stock maximum particle size 0.12”
c. coarse grain stock maximum particle size 0.50” *
d. all have same

242. Specific resistance of which of the following extruded graphite is higher
a. fine grain stock maximum particle size 0.015”
b. medium grain stock maximum particle size 0.12”
c. coarse grain stock maximum particle size 0.50” *
d. all have same

243. Specific resistance of which of the extruded graphite is lowest
a. fine grain stock maximum particle size 0.015” *
b. medium grain stock maximum particle size 0.12”
c. coarse grain stock maximum particle size 0.50”
d. all have same

244. Youngs modulus of which of the extruded graphite is highest
a. fine grain stock maximum particle size 0.015” *
b. medium grain stock maximum particle size 0.12”
c. coarse grain stock maximum particle size 0.50”
d. all have same

245. Youngs modulus of which of the extruded graphite is lowest
a. fine grain stock maximum particle size 0.015”
b. medium grain stock maximum particle size 0.12”
c. coarse grain stock maximum particle size 0.50” *
d. all have same

246. Thermal expansion of which of the extruded graphite is highest
a. fine grain stock maximum particle size 0.015”
b. medium grain stock maximum particle size 0.12”
c. coarse grain stock maximum particle size 0.50” *
d. all have same

247. Thermal expansion of which of the extruded graphite is lowest
a. fine grain stock maximum particle size 0.015” *
b. medium grain stock maximum particle size 0.12”
c. coarse grain stock maximum particle size 0.50”
d. all have same

248. Flexural strength of which of the extruded graphite is highest
a. fine grain stock maximum particle size 0.015” *
b. medium grain stock maximum particle size 0.12”
c. coarse grain stock maximum particle size 0.50”
d. all have same

249. Flexural strength of which of the following extruded graphite is lowest
a. fine grain stock maximum particle size 0.015”
b. medium grain stock maximum particle size 0.12”
c. coarse grain stock maximum particle size 0.50” *
d. all have same

250. Temparature in the range is essential to convert carbon to graphite is
a. 2600 - 3000 °C * b. 1440 - 2000 °C
c. 2400 - 3000 °C d. 1200 - 2500 °C

251. High purity graphite may have total impurities of
a. 400ppm b. 200ppm
c. 40 ppm d. 20ppm *

252. The ash content in the graphite increases as the diameter -------------
a. decreases b. remain same
c. increases * d. reduces

253. Bulk density is the
a. weight of one cubic metre in grams
b. weight of one cubic centimetre in kilogram *
c. weight of one cubic centimetre in gm
d. none

254. Compressive strength is the ratio of
a. $\frac{\text{crushing strength}}{\text{flexural strength}}$ *
b. $\frac{\text{flexural strength}}{\text{crushing strength}}$
c. $\frac{\text{crushing strength}}{\text{bulk strength}}$
d. none

255. Compressive strength of graphite is
a. 2.07 * b. 3.07
c. 1.07 d. 2.27

256. Compressive strength of graphite ---------------- with increase in temparature
a. increases * b. decreases
c. reduces d. remain same

257. Which of the following properties of graphite increases with increase in temparature
a. compressive strength b. crushing strength
c. flexural strength d. all the above *

258. Creep is the plastic flow under ------------- stress
a. constant * b. variable
c. increasing d. decreasing

259. Graphite displays ----------------- creep at room temparature
a. high b. low *
c. medium d. no

260. Flow characteristics of graphite is comparable with
a. diamond * b. charcoal
c. iron d. concrete

261. The stress strain cubes of graphite are ------------
a. not linear *
b. linear
c. may be non linear
d. either linear or non linear

262. Creep in carbon is at
a. 1500 °C b. 1000 °C *
c. 2000 °C d. 2500 °C

263. Creep decreases with ------------- temparature
a. increasing * b. decreasing
c. reducing d. same

264. Graphite is viscoelastic at --------------- temparature
a. high * b. low
c. medium d. any

265. Contact resistance of graphite to graphite increase with ------------------ in contact pressure
a. decrease * b. increase
c. same d. reducing

266. The ability to withstand a sudden load, conventionally measured, is called
a. machinability b. tensile strength
c. impact strength * d. none

267. Which of the following has higher consumption of heat
a. diamond * b. graphite
c. both have same d. none

268. Which of the following is comparable with Aluminium
a. graphite * b. diamond
c. charcoal d. carbon

269. Which of the following are the properties of graphite
a. it can be sawed b. it can be turned
c. it can be milled d. all the above *

270. At which temparature tensile strength of graphite is double to that of at room temparature
a. 1600 °C * b. 2500 °C
c. 1500 °C d. 2000 °C

271. Which of the following graphites are used in pencils and lubricants
a. amorphous graphite *
b. flake graphites
c. pyrolitic graphites
d. none

272. In which of the following industry graphites are used
a. engineering / processing
b. steel melting
c. non ferrous
d. nuclear
e. all the above *

273. Graphite components posses very good compressive strength as well as good oxidation resistant at ------
a. 400 °C b. 200 °C
c. 300 °C d. 600 °C *

274. Which of the following are the developing agency of graphites
a. Assam carbon products Ltd. *
b. U.P carbon products Ltd
c. M.P carbon products Ltd
d. Delhi carbon products Ltd.

275. Compression strength of graphite is
a. 400 kgs / cm^2 min
b. 600 kgs / cm^2 min *
c. 200 kgs / cm^2
d. 800 kgs / cm^2

276. Volumetric weight of graphite is
a. 1.7 gm / cm^3 * b. 2.1 gm / cm^3
c. 2.7 gm / cm^3 d. 2.8 gm / cm^3

277. Which of the following material used for the electrodes in electric funaces producing carbon steels
a. diamond b. graphite *
c. calcium d. potassium.

278. Reinforcing fibres are a key component of
a. Polymer matrix composites.
b. Ceramic matrix composites.
c. Metal matrix composites.
d. All of the above *

279. Fibres impart high
a. Strength to the matrix material.
b. Stiffness to the matrix material.
c. Toughness to the matrix material.
d. Strength and stiffness to the matrix material *

280. The laminate is cured under
a. High pressure
b. High temperature.
c. High pressure and temperature *
d. None of the above.

281. In a continuous fibre reinforced composite, the fibres provide.
   a. Virtually the entire load carrying characteristics of he composite *
   b. Actually the entire load carrying, characteristics of the composite.
   c. Average of the entire load carrying characteristics of the composite.
   d. None of the above.

282. In case of linear continuous fibres, the plies of the reinforcement may be
   a. Unidirectional.
   b. Unidirectional or at an angle to meet the specific loading *
   c. At an angle to meet the specific loading.
   d. None of the above.

283. The laminate made from woven fibres have yield strength and modulus some what .... than that made from linear fibres.
   a. Lower * b. Higher
   c. More d. None of the above.

284. Commonly used fibres in the world market are
   a. Aramid fibres b. polyethylene
   c. Aromatic polyester d. All of the above *

285. Very high modulus carbon /graphite is used where
   a. Controlled or zero thermal expansion is required *
   b. High thermal expansion is required
   c. No relation to thermal expansion is required
   d. Less pain and fatigue is required

286. Where water resistance is required, we use
   a. Fibre glass * b. Epoxy
   c. Boron d. None of these.

287. E-Glass is used where
   a. Greater resistance to acid is required.
   b. Radiation protection is required.
   c. Structural applications are required.
   d. Electrical applications are required *

288. S-Glass contains
   a. Silicon oxide b. Aluminium oxide
   c. Magnesium oxide d. All of the above *

289. Tensile strength of S-Glass is
   a. 10% more than that of E-Glass.
   b. 20% more than that of E-Glass.
   c. 30% more than that of E-Glass *
   d. Equal to that of E -Glass.

290. Modulus of elasticity of E -Glass is nearly
   a. 10% less than S-Glass.
   b. 20% less than S-Glass.
   c. 30% less than S-Glass *
   d. 40% less than S-Glass.

291. C-Glass is
   a. A material based on soda borosilicate.
   b. A chemical glass.
   c. Used where greater resistance to acid is required.
   d. All of these *

292. L -Glass is used
   a. Where radiation protection is required *
   b. Where greater resistance to acid is required.
   c. Both (a) and (b).
   d. None of these.

293. T -Glass have
   a. Higher tensile strength than E -Glass *
   b. Equal tensile strength than E -Glass.
   c. Lower tensile strength than E -Glass.
   d. None of these.

294. Carbon fibres have stiffness
   a. Lower than any metal.
   b. Greater than any metal *
   c. Equal to steel.
   d. Equal to Iron.

295. Carbon fibres are recognized by their
   a. White colour b. Black colour *
   c. Blue colour d. Red colour

296. PAN is short name of
   a. Poly -acrylo-nitrile *
   b. Polyethene-acrylo-nitrile
   c. Poly-acrylo-nitride
   d. Poly-acetele-nitride.

297. Pitch fibres diameter is
   a. Less than fibres formed from PAN.
   b. Larger than fibres formed from PAN *
   c. Equal to fibres formed from PAN.
   d. None of the above.

298. PAN based carbon fibres contain approximately
   a. 80-90% of carbon b. 92-95% of carbon *
   c. 95-98% of carbon d. 99% of carbon.

299. Graphite fibres contain
   a. 99% of carbon * b. 90% of carbon.
   c. 80% of carbon. d. 50% of carbon.

300. PAN based carbon fibres are produced at about
   a. 1000-1600°C b. 1832-2912°F
   c. Both (a) and (b) * d. None of the above.

301. Carbon fibres have
   a. Positive co-efficient of expansion in axial direction
   b. Negative co-efficient of expansion in axial direction*
   c. Zero co-efficient of expansion in axial direction
   d. None of the above.

302. Carbon fibre composites posses
a. Very good vibration damping characteristics *
b. Very poor vibration damping characteristics.
c. No vibration damping characteristics.
d. None of the above.

303. Carbon fibres are susceptible to corrosion when bonded to
a. Aluminium * b. Carbon
c. Iron d. Steel.

304. Aramid fibres are identified by their
a. Red colour b. Black colour
c. White colour b. Yellow colour *

305. Para-aramids includes
a. Dupont's kevlar (R) b. Azko's Twaron (R)
c. Dupont's Nomex (R) d. Both (a) and (b) *

306. Meta-aramids includes
a. Dupont's nomex (R) * b. SVM (R) fibres
c. Both (a) and (b) d. None of the above.

307. Aramid composites have
a. Relatively poor shear strength
b. Relatively poor tensile strength
c. Relatively poor compressive strength *
d. Both (a) and (b)

308. Kevlar composite possesses
a. Low compressive strength
b. High compressive strength
c. High tensile strength
d. Both (a) and (c) *

309. The modulus of elasticity of kevlar is nearly
a. 80% higher than that of glass fibre.
b. 60% higher than that of carbon fibre.
c. 40% higher than that of carbon fibre.
d. Both (a) and (b) *

310. The density of kevlar is
a. 40% less than that of glass fibre *
b. 10% less than that of glass fibre.
c. 5% less than that of glass fibre.
d. 2% less than that of glass fibre.

311. Density of carbon fibre is
a. 20% lower than that of kevlar. *
b. 10% lower than that of kevlar.
c. 20% higher than that of kevlar
d. 10% higher than that of kevlar.

312. Aramids absorb
a. Moisture b. Ultraviolet rays
c. Both (a) & (b) * d. None of these.

313. Commercially available high strength and high modulus polyethylene fibres include
a. Spectra (R) b. Dyneema (R)
c. Tekmilon (R) d. All *

314. Polyethylene fibres have specific gravity
a. Less than one * b. More than one
c. Equal to one d. Equal to two.

315. Density of polyethylene fibre is
a. 2/3rd of aramid fibre b. Half of aramid fibre
c. Half of carbon fibres d. Both (a) and (c) *

316. The abrasion resistance of polyethylene fibres can be
a. Upto 10 times than that of aramids *
b. Upto 5 times than that of aramids.
c. Upto 20 times than that of aramids.
d. Upto 25 times than that of aramids.

317. Polythene fibres have
a. Poor creep resistance
b. Good creep resistance
c. Excellent fatigue resistance.
d. Both (a) and (c) *

318. Polyethylene fibres are used due to
a. Good ultravoilet stability
b. Low density
c. High strength
d. All of the above *

319. The only commercially available aromatic polyester fibre is
a. Vectran (R) * b. Kevlar (R)
c. SVM (R) d. AZKO's Twaron (R)

320. Vectran's creep behaviour is
a. Better than aramid
b. Better than Polyetheline fibre
c. Both (a) and (b) *
d. None of the above.

321. Vectran is
a. Easy to cut b. Difficult to cut *
c. Non cutable d. None

322. Vectran composites have
a. Low moisture absorption.
b. Excellent damping characteristics.
c. High stiffness
d. All of the above *

323. PBO fibres have been produced with tensile moduli as high as
a. 470 Gpa * b. 570 Gpa
c. 670 Gpa d. 770 Gpa

324. Boron fibres are
a. Extremely hard
b. High compressive strength
c. High stiffness
d. All of the above *

325. Glass fibres are composed primarily of
a. 76.5% Silica and 14.2% sodium oxide.
b. 54.4% Silica and 14.2% sodium oxide.
c. 74.5% Silica and 24.2% sodium oxide.
d. 74.5% Silica and 14.2% sodium oxide. *

326. Refrasil contains
  a. 80.9% Silica b. 85.9% Silica
  c. 90.9% Silica d. 97.9% Silica *

327. Manufacturing process of G - Fibre is
  a. Leaching sodium from glass fibre *
  b. Drawn from a fused quartz rod
  c. Chemical vapour deposition.
  d. Pyrolysis of spun polysilazane.

328. Manufacturing process of Tenon is
  a. Leaching sodium from glass fibre
  b. Drawn from a fused quartz rod
  c. Chemical vapour deposition.
  d. Pyrolysis of spun polysilazane *

329. Composition of Tenon is
  a. Primarily silicon and nitrogen *
  b. SiC mantle onto a carbon core
  c. 99.7% Silica
  d. 90.0% Silica

330. Composition of textron boron filament is
  a. 97.9% Silica
  b. SiC mantle on to a carbon core
  c. B mantle on to a tungsten core *
  d. B mantle on to a carbon core

331. The choice of fibre to be used is based on
  a. Design criteria with which a component will have to comply.
  b. Cost effectiveness
  c. Both (a) and (b) *
  d. None

332. The most usual hybrid combinations are
  a. carbon/Aramid b. Aramid/Glass
  c. Carbon/Glass d. All *

333. Young's modulus of E-Glass is
  a. 72 Gpa * b. 87 Gpa
  c. 410 Gpa d. 99.1 Gpa

334. Relative density of kevlar 29 is
  a. 1.8 b. 1.44 *
  c. 2.6 d. 2.5

335. Nomex has
  a. 1.38 Relative density.
  b. 11.6 Gpa young's modulus.
  c. 0.60 Gpa tensile strength
  d. All *

336. Which of the following has highest relative density
  a. Boron b. E-Glass
  c. Steel * d. Aluminium

337. Which of the following have minimum tensile strength.
  a. Nomex * b. Boron
  c. Kevlar d. Twaron

338. Fibre diameter of Boron is
  a. 12 μm b. 50 μm
  c. 100 m * d. 200 μm

339. Commonly used weave patterns of fibre are
  a. Plain
  b. Plain and twill
  c. Plain, twill. Basket, Lino
  d. Plain, Twill, Satin, Basket, Lino *

340. Which one is high alkali
  a. Silicon oxide * b. Aluminium oxide
  c. Sodium oxide d. Calcium oxide

341. The production of glass fibres starts with the
  a. Dry mixing of silica sand and lime stone *
  b. Wet mixing of silica sand and lime stone.
  c. Dry mixing of silica sand and sodium oxide.
  d. None.

342. Excellent smoothness is found in
  a. Satin weave * b. Plain weave
  c. Twill weave d. Leno weave

343. Excellent symmetry is found in
  a. satin weave * b. Twill weave
  c. Basket weave d. Lino weave.

344. Young's modulus for Aluminium is
  a. 10 Gpa b. 30 Gpa
  c. 50 Gpa d. 70 Gpa *

345. Tensile strength of PBO is
  a. 4 Gpa b. 5.65 Gpa *
  c. 3.5 Gpa d. 7 Gpa

346. Young's modulus of silicon nitride is
  a. 100 Gpa b. 200 Gpa
  c. 300 Gpa * d. 400 Gpa

347. Strength and stiffness is expressed in
  a. Grams per denier (gpd) *
  b. Pascal -Sec (Pa-s)
  c. Stroke
  d. Poise

348. The primary structural components such as ribs and skin surface of the wing is fabricated by
  a. carbon / graphite composites *
  b. aluminium / chloride composites
  c. magnesium / silicate composites
  d. none of these

349. The common problem encountered with carbon / graphite when bonded with aluminium is
  a. brittle b. corrosive *
  c. breakable d. flexible

350. The special - corrosion techniques employed to counter the corrosiveness of carbon / graphite, aluminium bond is
a. applying paint
b. chrome plated
c. fibre glass barrier, anodized aluminium, primed, then painted *
d. none of these

351. The main barrier used in anti corrosive coating is
a. fibre glass * b. aluminium foil
c. nitride sheet d. all the above

352. Boron fibre are made by depositing boron on to a thin filament of
a. Molybtenum b. Vanadium
c. Tungsten * d. none of these

353. The diameter of the anti corrosive element Boron fibre is
a. .004 mm b. 0.004 ft.
c. .004 inch * d. all the above

354. The main cause of rejection of boron fibre as anti corrosive agent in civil aviation is
a. because of non availability
b. because of tedious preparation process
c. because of hazardous to work with & expensive *
d. none of these

355. The cheap substitute of boron in civil aviation is
a. composite of aramid & carbon / graphite *
b. resin - titanium mix
c. rubber - calcium carbonate mix
d. none of these

356. The ceramic fibres are used in the application where
a. high temperature exists *
b. low temperature out fit
c. coolest temperature
d. none of these

357. The fibre of ceramic can maintain it's strength and flexibility up to the temperature of
a. 4000^0 F b. 2200^0 F *
c. 1000^0 F d. 1500^0 F

358. The tiles of the space shuttle are made up of special
a. resin composite
b. rubber composite
c. ceramic composites *
d. none of these

359. The main criteria because of which ceramic composite finds application in space craft are
a. absorbs heat and flexible
b. heat resistant and dissipates heat quickly *
c. can with stand different atmospheric condition
d. all the above

360. Fire walls of shuttles are made up of the composites of
a. aramid fibre b. glass fibre
c. ceramic fibre * d. none of these

361. Most of the ceramic fibres are often used with
a. glass matrix b. rubber matrix
c. metal matrix * d. none of these

362. The fibre glass, aramid & carbon graphite all are of
a. resin varieties b. rein forced fibre *
c. anti corrosive agents d. none of these

363. The strength of the re-inforcing material in a matrix is dependent on
a. weave of the material and its wetting process *
b. atomic structure
c. thickness of the material
d. all the above

364. What happens to the tensile strength of the material because of the resins attempt to make the structure brittle
a. increases b. decreases *
c. remains constant d. none of these

365. To find the amount of strength in the laminate, the common sense method is
a. 50% fibre + 50% resin (their tensile strength res. & divide by two) *
b. by arithmetic means
c. graphical means
d. none of these

366. The selective placement of fibre to give the greatest amount of strength in various application is known as
a. fibre calculus b. fibre technique
c. fibre science * d. fibre formula

367. The strength and stiffness of a composite build up depends on
a. orientation of the piles to the load direction *
b. orientation of the piles in the opposite direction
c. orientation of the piles in the perpendicular direction
d. orientation of the piles in the radial direction

368. A helicopter rotor blade has high stress along the length because of
a. centrifugal force
b. centripetal force *
c. lateral force
d. unidirectional force

369. The zero degree piles means
a. vectors of strength in which fibres are running along the length of the blade *
b. across the blade
c. diagonal of the blade
d. none of these

370. The zero degree piles of a rotor blade's main objective is
   a. to react to an axial load *
   b. to react to a radial load
   c. to react to a lateral load
   d. none of these

371. The 45 degree piles are to react
   a. stress vector
   b. shear vector *
   c. bending moment vector
   d. none of these

372. The 90 degree piles are to react
   a. axial load b. lateral load
   c. side load * d. all the above

373. In the wings of the flight a layer with the fibres running at 45 degree and 90 degree to limit the
   a. bend b. crash
   c. twist * d. all the above

374. Mostly the strength of the fibres are in which direction to that of threads
   a. along b. perpendicular
   c. radial d. parallel *

375. In order to avoid the wing failure due to aerodynamic force in x-29 forward swept wing experimental jet fighter has how many layers of unidirectional carbon / graphite
   a. 256 b. 356
   c. 56 d. 156 *

376. What are the terms weft (III) selvage edge and bias refer to
   a. fibre orientation * b. methods of design used
   c. layers name d. none of these

377. The thread which run the length of the fabric as it comes off the bolt are referred to as the
   a. weft b. selvage
   c. warp * d. bias

378. The direction of the wrap designated at what degree ?
   a. 100^0 b. 90^0
   c. 75^0 d. 0^0 *

379. In the woven application, the threads in warp is more than
   a. fill direction * b. store direction
   c. in all the direction d. none of these

380. The plastic backing on the under side of pre-pregs are done to identify
   a. warp threads * b. weft threads
   c. bias threads d. none of these

381. The threads which run perpendicular to the warp fibres are
   a. warp threads b. weft threads *
   c. bias threads d. none of these

382. Which of the thread inter weave with the warp threads
   a. fill or weft * b. bias threads
   c. both a & b d. none of these

383. A tightly woven edge produced by the weaver to prevent the edge from ravelling is referred to as the
   a. warp edge b. selvage edge *
   c. fill edge d. none of these

384. The selvage edge is removed for all fabrication and repair work because
   a. the weave is different than the body of the fabric and would not give the same strength as the rest of the fabric *
   b. it will get damaged
   c. can create some other practical problems
   d. all the above

385. The shape which can be formed by using bias is
   a. elliptical b. cycloidal
   c. spiral d. contouned shape *

386. Is it required that fabric can often be stretched along the bias but seldom along the warp or weft ?
   a. yes * b. no
   c. occasionally d. not all the time

387. What do you understand by the terms, unidirectional, bi-directional mats
   a. styles of material used in aircraft construction *
   b. varieties of aircraft design
   c. types of wings
   d. none of these

388. Fibre orientation in which all of the major fibres run in one direction giving strength in that direction is called
   a. unidirectional * b. bi-directional
   c. multidirectional d. none of these

389. Tapes are made up of a
   a. copper b. tungsten
   c. carbon graphite * d. none

390. Why unidirectional tapes are usually preimpregnated with resin because
   a. unidirectional material are difficult to manually saturate with resin *
   b. to reduce cost of production
   c. to improve the product performance
   d. all the above

391. Chopped fibres that are compressed together are often called as
   a. fabric weaves b. mats *
   c. both a and b d. none of these

392. Why mats are not commonly used in repair work ?
   a. because they are not strong *
   b. because they are costly
   c. because they are not freely available
   d. none of these

393. The cost of woven fabric is usually higher because of the
a. weaving operation *
b. material itself is costlier
c. non availability of specific labours
d. none of these

394. The weaves which are commonly used for repairing work is
a. primary weaves b. satin weaves *
c. secondary weaves d. none of these

395. What are these numbers are 7781,181,1581 ?
a. typical styles of satin weaves *
b. various aircraft model
c. various aircraft section
d. none of these

396. The style 120 has
a. 100 threads b. 75 threads
c. 60 threads * d. none of these

397. The details like type of material, proper form of material and proper weight and weave are available in
a. operational manual
b. structural repair manual *
c. annual general body meeting manual
d. all the above

398. The design of a part by a manufacturer by using different types of fibre combination is called
a. monobrid b. hybrid *
c. multilayer d. none of these

399. The material Kevlar is combined with carbon /graphite to produce a structure which posses the property of
a. hardness b. toughness
c. flexibility * d. elasticity

400. The material Kevlar and fibre glass are combined because
a. to produce a less expensive material *
b. to produce tougher material
c. to produce good quality
d. none of these

401. In intraply hybrids, the strength of the final structure can be based on
a. proportions of each fibre used *
b. quality of the fibre used
c. grade of the material
d. all the above

402. Matrix are mixed with reinforcing fibres to give
a. primary strength * b. sec. strength
c. lateral strength d. none of the above

403. The basic materials which can be mixed with the other and combination is called
a. hybrids * b. low brids
c. monobrids d. none

404. The specific patterns of woven are called
a. natural science b. geo science
c. fibre science * d. none

405. Rigid forms are called
a. fabric structure b. architecture
c. sandwich structure * d. none

406. Which one is the common type of reinforcing fibre
a. PVC b. LCDP
c. rubber d. fibre glass *

407. The main constituents of fibre glass is
a. sodium silicate b. crystal glass
c. silica glass molten * d. none

408. The different weaves of fibre glass are based upon their
a. production b. application *
c. sizes d. none

409. The cost of the fibre glasses are generally
a. high b. medium
c. low * d. moderate

410. The weight of the fibre glass when compared with same category mat. is
a. low b. medium
c. moderate d. high *

411. The strength of the fibre glass mat. is when compared with other composite material is
a. high * b. low
c. medium d. moderate

412. The material which makes fibre glass material more brittle is
a. synthetic resin b. high carbon resin
c. polyester resin * d. none

413. By the development of the matrix formula the fibre glass has benefited as a
a. structured fibre b. reinforcing fibre *
c. matrix fibre d. none

414. Two common type of fibre glass are
a. A and B glass b. C and D glass
c. E and S glass * d. none

415. E-glass are called
a. eco - glass b. economical glass
c. electric glass * d. none

416. The resistivity of the E glass is
a. low b. moderate
c. high * d. very low

417. The other name of the E - glass is
a. mono silicate glass b. di - silicate glass
c. borosilicate glass * d. none

418. The most common type of fibre glass used as reinforced glass is
a. N. glass b. F. glass
c. E. glass d. none *

419. S.glass is a
a. chromia silicate glass
b. uanadia silicate glass
c. magnesia-alum in silicate glass *
d. none

420. The uses of S-glass is based mainly on
a. very high brittle strength
b. very high destruction strength
c. very high tensile strength *
d. none

421. The fibre glass becomes very excellent rein forcing fibre when it is
a. with new type of matrix and proper science *
b. any common method
c. any type of matrix
d. none

422. The new fibre glass composites are compared for strength to weight with
a. aluminium material* b. copper material
c. iron material d. none

423. The clever method which uses to combine fibre glass with other expensive fibres are called
a. solar b. mounar
c. kevlar* d. none

424. The method of kevlar is used to produce
a. mono-brid b. hybrid *
c. tri-brid d. none

425. The other type of expensive fibres are
a. carbon-graphite * b. sodium-graphite
c. alumina d. none

426. The colour of Armid fibre is
a. green b. red
c. yellow * d. blue

427. The weight criteria of the Armid fibre is
a. high b. medium *
c. very moderate d. low

428. The tensile strength of Armid fibre is
a. good b. better
c. best d. excellent*

429. The Armid fibre has remarkable
a. rigidity b. flexibility *
c. elasticity d. none

430. Armid is the name given to
a. aromatic polyamide fibre *
b. schematic polyamide fibre
c. stretched polyamide fibre
d. none

431. Kevlar is the registered trade mark of
a. johnson and johnson b. cotex
c. a- international
d. EI due point company *

432. The stretchability of kevlar before it break is
a. breat b. fair
c. bad d. none

433. The tensile strength of alloyed aluminium is about
a. 75000 PSI b. 61000 PSI
c. 90000 PSI d. 10000 PSI

434. The tensile strength of kevlar is
a. higher than alloyed aluminium *
b. lower than alloyed 'Al'
c. equal to alloyed aluminium
d. none

435. The structural grade of kevlar fibre used in aircraft is called
a. kevlar 49 * b. kevlar 39
c. kevlar 29 d. none

436. The structural grade of kevlar fibre used in boat is
a. kevlar 49 b. kevlar 39
c. kevlar 29 * d. none

437. The structural grade of kevlar fibre used in bullet proof sacket is
a. kevlar 49 b. kevlar 39
c. kevlar 29 d. none *

438. The kevlar fibre used in bullet proof jacket and aircraft are
a. different type * b. same type
c. almost equal d. none

439. The kevlar fibre used to manufacture bullet proof jacket is having more
a. tensile b. brittle *
c. cracuring d. none

440. the kevlar fibre used in the manufacture of bullet proof jacket is made up of
a. monolayer b. di-layer
c. multilayer * d. none

441. The aircraft material is made up of kevlar because they have to withstand
a. low stress and medium vibration
b. high stress and high vibration *
c. medium stress and vibration
d. none

442. The helicopter main rotor blade and hubs are made up of
    a. armid fibre * b. glass fibre
    c. tinted fibre d. none

443. By the use of armid fibre the rotor blades of helicopters
    a. can withstand bend and twist in flight *
    b. cannot withstand the bend and twist
    c. to some extent can withstand
    d. none

444. The armid fibres are used in the substitute to metal because to avoid
    a. crack due to fatigue and stress *
    b. because of low cost
    c. longer durability
    d. none

445. The draw backs of armid fibre are
    a. cutting and drilling problem *
    b. height weight
    c. high cost
    d. all the above

446. The moisture in the form of water or oil causes the armid fibres
    a. detoriate and separate *
    b. break the fibre
    c. rust the fibre
    d. none

447. The compressive strength of armid fibre is
    a. excellent b. good
    c. low * d. not bad

448. The carbon / graphite is compressive strength when compared to armid fibre is
    a. greater * b. lower
    c. equal d. none

449. The material which describes the fibre is
    a. carbon * b. graphite
    c. copper d. aluminium

450. The weight and the weave of carbon ^{1} 584 and graphite ^{1}584 are
    a. different b. almost equal
    c. exactly same * d. none

451. The nature of black fibre is
    a. very strong, stiff, rigid strength *.
    b. moderately strong, flexible
    c. very weak and soft
    d. none

■■■

CHAPTER - 77
MATRIX MATERIALS

1. Resin Matrix system acts as a
   a. Binding agent * b. Braking agent
   c. Substracting agent d. None

2. When too much resin is used, the part is classified as
   a. Resin starved b. Resin rich *
   c. Resin poor d. None

3. When too little resin is used, the part is classified as
   a. Resin starved * b. Resin rich
   c. Resin excellence d. None

4. Resin starved part is
   a. Strong b. Weaker *
   c. Very strong d. None

5. Matrix material serves the following function in a composite material.
   a. Protect the fibres from moisture.
   b. Carry inter laminar shear.
   c. Holds the fibres together.
   d. All. *

6. Selection of a matrix has a major influence
   a. On the inter laminar shear of the composite material
   b. In plane shear properties of the composite material
   c. Both (a) and (b) *
   d. None

7. In Plane shear strength is important under
   a. torsion loads * b. Bending load
   c. Tensile load d. All

8. Defects in a composite material depend on the
   a. Viscosity b. Melting point
   c. Curing temperature d. All *

9. Desirable properties of the matrix are
   a. Low shrinkage
   b. Co-efficient of thermal expansion is low
   c. Dimensional stability
   d. All *

10. The desired properties of the matrix is
    a. Reduced moisture absorption *
    b. High shrinkage.
    c. High coefficient of thermal expansion
    d. None

11. Glass transition temperature
    a. is at which matrix begins to soften
    b. Exhibits a decrease in mechanical properties
    c. Both (a) and (b) *
    d. None

12. Physical properties of the matrix which influence the behaviour of composites are
    a. Modulus of elasticity
    b. Ultimate elongation
    c. Fracture toughness
    d. All *

13. When selecting a matrix material, which factor/factors may be taken into consideration.
    a. The matrix must have a mechanical strength
    b. The matrix must stand up temperature
    c. The matrix must stand up humidity.
    d. All *

14. Which of the following is /are matrix material
    a. Thermosetting material
    b. Thermoplastic material
    c. Carbon
    d. All *

15. Thermoplastics
    a. Undergo a chemical reaction on applying heat
    b. Do not under go a chemical reaction on heating.
    c. They simply melt on application of heat.
    d. Both (b) and (c) *

16. Thermosetting resins under go
    a. Irreversible chemical cross-linking reaction upon application of heat *
    b. Reversible chemical reaction when applying heat.
    c. no chemical reaction when applying heat.
    d. None

17. Thermoplastics can be
    a. Repeatedly softened by heating
    b. Repeatedly hardened by cooling
    c. Both (a) & (b) *
    d. None

18. Thermoset resin cost is
    a. Equal to thermoplastic resin
    b. Lesser then thermoplastic resin *
    c. Higher then to thermoplastic resin
    d. None

19. Thermoplastics exhibit
    a. Poor resistance to fluids and solvents *
    b. Good resistance to fluids and solvents
    c. Excellent pre - pregability characteristics
    d. None

20. Which one of the following is thermoset
    a. Epoxy * b. Polypropylene
    c. Nylon d. None.

21. Which one of the following is thermoplastic
 a. Poly-ether-sulphone (PES) *
 b. Polymides
 c. Bismaleimide (BMI)
 d. None

22. Which of the following is /are thermosets ?
 a. Epoxy
 b. Polymide
 c. Polyster & vinyl esters
 d. All *

23. Which of the following is/are thermoplastics ?
 a. Polypropylene b. Nylon
 c. Bismaleimide d. (a) and (b) *

24. Thermoset is
 a. Tough b. Hard
 c. Soluble d. (a) & (b) *

25. Curing is accomplished by
 a. Heat
 b. Pressure
 c. Adding of curing agents
 d. All *

26. Epoxy resins have following advantages
 a. No by-products formed during cure *
 b. By-products formed during cure
 c. High shrinkage during cure
 d. No resistance to creep and fatigue

27. Epoxy resins have following disadvantages.
 a. Limited to about 200°C upper temperature use.
 b. Limited to about 300°C upper temperature use.
 c. Limited to about 322°F upper temperature use.
 d. (a) and (c) *

28. Advantages of epoxy resin are
 a. Resistance to solvents and chemicals
 b. Resistance to creep and fatigue
 c. High curing charactoristics
 d. Both (a) and (b) *

29. The most widely used matrices for advanced composites are
 a. Epoxy resins * b. Polyamides
 c. Nylons d. None

30. Common use of resin systems for high temperature is/are
 a. Epoxies b. Bismaleimides
 c. Polyimides d. Both (b) and (c) *

31. Cyanate ester resins show
 a. Superior dielectric properties
 b. Much lower moisture absorption
 c. Much higher moisture absorption
 d. Both (a) and (b) *

32. Phenolics are of
 a. Low cost
 b. good dimensional stability
 c. good thermal stability
 d. All *

33. Phenolics have
 a. Poor mechanical strength
 b. Good mechanical strength *
 c. Poor laminate properties
 d. All

34. Phenolics have
 a. Excellent high temperature resistance
 b. Good laminate properties
 c. Good mechanical properties
 d. All *

35. Disadvantage of phenolics is, that
 a. By-products are produced during curing *
 b. it is costly
 c. it has no dimensional stability
 d. it posses poor mechanical strength

36. Advantage of phenolics is, that, it have
 a. Low cost *
 b. High curing shrinkage
 c. Good chemical resistance
 d. All

37. Advantages of polyester are, that, it have
 a. Low viscosity
 b. Good mechanical strength
 c. Good heat resistance
 d. All above *

38. Disadvantages of polyesters are, that, it have
 a. lesser inter laminar shear
 b. poor chemical resistance
 c. Both (a) and (b) *
 d. None of these.

39. Advantages of vinyl ester are, that, it have
 i. Good chemical resistance
 ii. Corrosion resistance
 iii. Inherent toughness
 iv. Resistance to hydrolysis
 a. [i], [ii] b. [i], [ii], [iii]
 c. [i], [iv] d. [i], [ii], [iii], [iv] *

40. Properties of polyamides are that, it have
 a. Excellent electrical properties
 b. Excellent mechanical strength
 c. Good fire resistance
 d. All *

41. Disadvantages of Polyimides are, that
 i. its laminates are poor
 ii. its volatile by-product are given off during cure
 iii. it have poor electrical properties
 iv. it have poor mechanical strength
 a. [i] and [iii] b. [i] and [iv]
 c. [i] and [ii] * d. [iii] and [iv]

42. Advantages of Epoxies are, that, it have
    i. Low shrinkage
    ii. Flame resistance
    iii. Good chemical resistance
    iv. Good mechanical properties
    a. only [i] b. [i] and [ii]
    c. [i],[ii] and [iii] d. [i],[ii],[iii] and [iv] *

43. Advantages of thermoplastics are, that, it have
    a. Improved damage tolerance
    b. Environmental resistance
    c. Both (a) and (b) *
    d. None

44. Thermoplastics can
    a. be recycled
    b. not be recycled
    c. be combined with other recycled materials
    d. (a) and (c) *

45. Thermoplastics usually require__________ during processing.
    a. High temperature b. High pressure
    c. Both (a) and (b) * d. None

46. PEEK polymer is used in
    a. EH 101 helicopter floor *
    b. Air bus A 340 aileron ribs
    c. Fokker 50 main landing gear door
    e. All

47. Poly-phenylene-sulphide is used in
    a. Air bus A 320-200 rudder nose ribs
    b. Airbus A 340 aileron ribs
    c. Fokker 50 main landing gear door
    d. All *

48. PEI is used in
    a. 737 smoke detector pans
    b. Fokker 50 main landing gear door
    c. 747 stowage bins
    d. Both (a) and (c) *

49. Processing temperature of PEEK is
    a. 200-240ºC b. 270-320ºC
    c. 380-400ºC * d. 300-320ºC.

50. Tensile modulus of poly propylene is
    a. 1.1-1.6 Gpa * b. 2.5-3.8 Gpa
    c. 3.1-3.8 Gpa d. 2.6 Gpa

51. Processing temperature, tensile modulus and tensile strength of PEI are respectively
    a. 200-400ºC, 1.1-1.6 Gpa, 30-40 Mpa
    b. 270-320ºC, 2.5-3.8 Gpa, 50-80 Mpa
    c. 335-420ºC, 3.0 Gpa, 30-40 Mpa
    d. 335-420ºC, 3.0 Gpa, 105 Mpa *

52. Thermoplastics with low Tg have
    a. Lower modulus
    b. Lower strength
    c. Higher fracture toughness
    d. All *

53. HDT is determined by subjecting the material to static load of
    a. Typically 1 Mpa b. Typically 1.2 Mpa
    c. Typically 1.4 Mpa d. Typically 1.8 Mpa *

54. Variation of HDT in PEEK is
    a. Below Tg
    b. At Tg
    c. Above Tg *
    d. There is no such relation

55. Structure of PEEK is
    a. Amorphous b. Crystalline *
    c. Both d. None

56. The primary advantage of crystallinity is
    a. Chemical resistance * b. Electrical resistance
    c. Heat resistance d. None

57. Percentage absorption of water in PEEK is
    a. 0.5 * b. 0.9
    c. 2 d. 8

58. Effect of ketones on PEEK is
    a. More b. Less
    c. Nil * d. moderate

59. PEEK has
    a. High impact resistance
    b. High fatigue resistance
    c. Both (a) and (b) *
    d. None

60. Fracture toughness of PEEK is about
    a. 50-100 times lower than epoxies
    b. 50-100 times higher than epoxies *
    c. 50-100 times lower than PES
    d. 50-100 times lower than PEI

61. Most commonly processing technique for thermoplatics is
    a. Injection moulding * b. Casting
    c. Both (a) and (b) d. None

62. Carbon-carbon composites have following properties
    a. Low specific weight
    b. High heat absorption capacity
    c. Resistance to thermal shock
    d. All *

63. Manufacturing time and cost of carbon-carbon composites are respectively.
    a. Short, low b. Long, low
    c. Short, high d. Long, high *

64. Carbon-carbon composites are used as braking materials due to
    a. High-energy absorption capacity
    b. Low specific weight
    c. Do not contain any environmentally harmful elements
    d. All *

65. Conventional aircraft landing gear brakes are made up of
a. A torque tube
b. A torque tube and a loading system for the heat sink
c. A torque tube and a heat sink
d. A torque tube, a loading system for the heat sink and a heat sink *

66. The heat sink is made of
a. Rotors b. Stators
c. Torque tube d. Both (a) and (b) *

67. Rotors are fitted to the
a. Wheel * b. Torque tube
c. Heat sink d. None

68. The material used for a heat sink should have
a. Very high specific heat
b. Good resistance to thermal shock
c. Low thermal expansion
d. (a), (b) and (c) *

69. For carbon-carbon composite, the maximum allowabletemperature is
a. 1000°C b. 2000°C *
c. 3000°C d. 4000°C

70. The advantage of carbon-carbon brakes is
a. Smooth braking * b. Low efficiency brake
c. Its life is less d. More weight

71. Carbon-carbon pistons are used due to
a. Reduction in weight
b. Increase in thermal efficiency
c. Increase in mechanical efficiency
d. All *

72. Disadvantages of metallic matrices are
a. High specific gravities
b. High melting point
c. Less tendency toward corrosion
d. Both (a) & (b) *

73. Aluminium alloy matrix composites are used where
a. Temperature is below 1000°C
b. Temperature is below 1500°C
c. Temperature is below 750°C
d. Temperature is below 400°C *

74. The melting temperature of ceramic matrix is
a. Above 1600°C * b. Above 2000°C
c. Above 3000°C d. Above 4000°C

75. Matrix should resist
a. Cracking b. Chemical attack
c. Ultra voilet light d. All *

76. Composites can be made electrically conductive by the addition of
a. Metal b. Carbon particles
c. Conductive fibres d. All *

77. Foamed plastics exhibit
a. Lower density
b. Higher density
c. Increased thermal insulation
d. Both (a) and (c) *

78. Fillers are used to
a. Reduce resin cost
b. Improve resin's physical properties
c. Improve impact strength
d. All *

79. Commonly used fillers are
a. Calcium carbonate and calcium bicarbonate
b. Sodium carbonate and calcium carbonate
c. Sodium carbonate and clay
d. Calcium carbonate, hydrated alumina and clay *

80. Calcium carbonate fillers are derived from
a. Lime stone
b. Marble
c. Lime stone and marble *
d. None

81. Kaolin is used to
a. Control viscosity b. Promote flow
c. Improve resistance d. All *

82. When excessive release agent is used it can
a. Reduce mechanical strength
b. Affect adhension characteristics
c. Reduce thermal strength
d. Both (a) and (b) *

83. Colorants are used in composites to
a. Provide colour *
b. Provide mechanical strength
c. Provide surface finish
d. Provide thermal strength

84. Matrix is the bonding material that completely surrounds the fiber to
a. give strength * b. transfer the stress
c. both of above d. none of the above

85. Most of the matrix formulas, presently in use on aircraft primary structure are
a. polyester resin b. epoxy resins
c. both above * d. none of the above

86. The newer matrix materials display remarkably improved
a. stress distributing charactoristics
b. heat and chemical resistance
c. durability
d. all above properties *

87. Resin matrix consists of
a. resin b. catalyst
c. both above with fiber d. a and b *

88. Catalyst in matrix system acts as
   a. bonding agent b. re-inforcing agent
   c. curing agent * d. all above

89. Resin matrix system are a type of plastic, such as
   a. polyester b. thermo plastic
   c. thermosetting d. b and c *

90. Thermoplastics resins
   a. uses heat to form the shape
   b. on re-heat changes shape
   c. does not soften with application of heat
   d. are as mentioned in a & b *

91. Thermoset resins
   a. use heat to form the shape
   b. once cured, cannot be reformed with heat
   c. process is irreversible
   d. posses all above charactoristics *

92. Thermoset resins are used for composites to fabricate
   a. aircraft non structural parts
   b. aircraft structural parts
   c. parts located in the vicinity of relatively hotter area
   d. parts as a & b *

93. Thermoplastic resins are used for
   a. primary structural parts
   b. secondary structural parts
   c. non structural applications *
   d. none of the above

94. With advancement of composite science the thermoplastic resins finding their way for structural parts where temperature does not exceed
   a. 500^0 F b. 600^0 F
   c. 650^0 F d. 750 *

95. Epoxy resins posses outstanding
   a. adhesion
   b. strength
   c. moisture and chemical resistance
   d. qualities as described above *

96. Epoxy resins are very useful for
   a. bonding non porous materials
   b. bonding dissimiliar materials
   c. bonding as above
   d. nothing as said above *

97. The quality of bonds depend upon the design for specific application, such as
   a. high/low temperature b. rigid/flexible
   c. fast/slow cure d. all above *

98. Epoxy resin may be compatible with
   a. only one catalysts
   b. two catalysts
   c. two or more catalysts *
   d. no usage of catalyst

99. It is important to mix the resin system properly. Each part of the resin is taken by
   a. weight * b. volume
   c. according to viscosity d. any of the above

100. Resin and hardener are mixed
   a. before mixing fillers * b. along with fillers
   c. seperatly with filler d. in any way as above

101. If refrigerated resin are used, then
   a. it is to be warmed up to room temperature
   b. it will weigh havier than at room temperature
   c. it will weigh lighter than at room temperature
   d. do as per a in consideration with b *

102. Mark the incorrect statement
   a. resin not to be mixed fast but take appropriate time
   b. do not mix large amount together
   c. shelf life is, the product is good in opened container *
   d. in advanced composits resins 50 : 50 ratio is good

103. While working the resin with fibers ensure
   a. weave of the fabric is not distorted
   b. it is cured as per curing requirements
   c. the both above *
   d. that fiber is immersed in resin well

104. The resin system may be supplied in a pre packaged form which eliminate
   a. mixing b. weighing
   c. curing d. b and a *

105. A desposable pre-packaged resin cartridge performs
   a. as store b. as mixer
   c. as applier d. as all above *

106. Adhesives are used for
   a. bonding * b. laminating
   c. both above d. none of the above

107. One of the most unique form of resin adhesive is
   a. cartridge form b. can adhesive
   c. film form * d. none of the above

108. Foaming adhesives are usually used for
   a. general purposes
   b. laminations
   c. splice replacement honeycomb segments *
   d. all above

109. Pre-preg fabrics are manufactured to eliminate
   a. weighing b. mixing
   c. applying d. all above *

110. Mark the correct statement
   a. pre-preg fabrics are manufactured by dipping the woven fabric in prepared resin system
   b. fabrics after dipping resin system are dried intowers
   c. parting film is used for rolling the pre-preg fabrics
   d. all above statements are correct *

111. Mark the disadvantage of pre-preg fabrics
a. pre-pregs have short shelf life
b. pre-pregs are comparatively expansive
c. composite materials are not yet standardised
d. all above are disadvantages of pre-preg fabrics *

112. Filler materials are added to resin to
a. control viscosity and weight
b. increase pot life
c. make the application of resin easier
d. obtain all above *

113. When filler is used as a 'thixotropic agent' , it
a. increases volume b. reduces weight
c. reduces density d. does all above *

114. Fillers are inert and does not react chemically with the resin. These are available in the form of
a. micro balloons b. chopped fibers
c. flox d. all above *

115. Mark the incorrect about the fillers
a. micro balloons do not add strength
b. micro balloons add strength *
c. chopped fibers add strength
d. flox add strength

116. Chopped fibers as a filler are cut to certain length i.e.
a. 1/4 to 1/2 inch * b. 1/8 to 1/4 inch
c. 1/2 to 1 inch d. 1 to $1\frac{1}{4}$ inch

117. Flox filler is made from
a. saw dust b. fabric strands (fuzzy) *
b. thin strips of fiber d. any of the above

118. The repair of a wrongly drilled hole in composite material can easily be done with batter strength, by
a. resin with chopped fiber
b. resin itself
c. resin with flox filler *
d. micro balloons with resin

119. Metal which is used to make metal matrix might be
a. aluminium b. titanium
c. steel d. any of the above *

120. Composites made with fibers and metal matrix system may
a. increase the wear resistance
b. dissipate the heat quickly
c. give more flexibility
d. give all above *

121. The functions of matrix material are
a. protect the fibres from environment
b. enhance transverse properties of a laminate
c. carry interlaminar shear
d. holds the fibre together
e. all of the above *

122. The properties of the matrix which are important for a composite structure are
a. reduced moisture absorption
b. low shrinkage
c. dimensional stability
d. all of the above *

123. Some properties of the Matrix which influence the behaviour of composites are
a. modulus of elasticity
b. ultimate elongation
c. fracture toughness
d. all the above *

124. Factors taken into consideration during the selection of a matrix material
a. smoke requirement b. life expectancy
c. both of the above * d. none of the above

125. Types of matrix material that are available
a. carbon b. metals
c. insulators d. both a and b *

126. thermoset has
a. low cost *
b. shrinkage of thermoplastic is low
c. prepregability characteristics are poor
d. interlaminar fracture toughness is high

127. Thermoplastics has
a. it exhibits poor resistance to fluids and solvents. *
b. composite mechanical properties are good
c. toughness is lone
d. none of the above

128. Thermoset resins are
a. polyimides b. epoxies
c. both of the above * d. nylon

129. Thermoplastics are
a. PEEK * b. polyimides
c. none of the above d. both of the a and b

130. Advantages of the Epoxies are
a. adjustable curing rate
b. resistance to creep and fatigue
c. both a and b *
d. none of the above

131. Disadvantages of the Epoxies are
a. stone curing * b. fast curing
c. both a and b d. none of the above

132. Phenolies have
a. low cost
b. high cost
c. good mechanical strength
d. both a and c *

133. Curing temperature for phenolics is
 a. 170^0 C * b. 200^0 C
 c. 120^0 C d. 160^0 C

134. Curing temperature for polyesters is
 a. 120^0 C * b. 200^0 C
 c. 170^0 C d. 160^0 C

135. Polyesters have
 a. good heat resistance *
 b. poor heat resistance
 c. both a and b
 d. none of the above

136. Curing temperature of polyimides
 a. 175^0 C and 315^0 C * b. 120^0 - 175^0 C
 c. 90^0 - 100^0 C d. 175^0 C

137. Curing temperature of Epoxies are
 a. 120^0 C - 175^0 C * b. 175^0 C - 315^0 C
 c. 90^0 C - 100^0 C d. 350^0 F

138. PEEK has following application
 a. F-22 access covers
 b. OH-58 D helicopter horizontal stabilizer
 c. both a and b *
 d. none

139. Poly-phenylene sulphide
 a. airbus A340 aileron ribs.
 b. fokker 50 main landing gear door.
 c. none of the above
 d. both a and b *

140. Carbon - carbon composites are used in
 a. low specific weight
 b. chemical inertness
 c. both *
 d. none

141. Advantages of the carbon - carbon brakes are
 a. smooth braking b. high efficiency brake
 c. both a and b * d. none

142. PEI has
 a. 737 / 757 galleys
 b. 767 aircraft acoustical tiles
 c. both a and b *
 d. none

143. One factor that limits wider use of bismaleimide is that
 a. they require higher curing temperature than epoxies. *
 b. they require lower curing temperature than epoxies.
 c. none
 d. they have equal curing temperature to epoxies.

144. Polypropylene has
 a. Tg^0 C = - 10 and T^0 mC = 165 *
 b. Tg^0 C = 55 and T^0 m C = 265
 c. Tg^0 C = 143 and T^0 m C = 343
 d. Tg^0 C = 220 and T^0m C = 217

145. Polyamide has
 a. processing temperature 200^0 - 240^0 C
 b. processing temperature 270^0 - 320^0 C *
 c. proessing temperature 380^0 - 400^0 C
 d. none

146. Polypropylene has
 a. processing temperature 200^o - 240^o C *
 b. processing temperature 270^o - 320^o C
 c. processing temperature 380^o - 400^o C
 d. none

147. Polyamide has
 a. T^0 g C = - 10 and T^0 m C = 165
 b. T^0 g C = 55 and T^0 m C = 265 *
 c. T^0 g C = 143 and T^0 m C = 343
 d. none

148. PEEK has tensile strength (in M Pa)
 a. 90 - 100 * b. 50 - 80
 c. 30 - 40 d. 80

149. Polyamide has tensile strength (in M Pa)
 a. 90 - 100 b. 50 - 80 *
 c. 80 d. 105

150. Fracture toughness (KJ/m^2) of PEEK is
 a. 4 * b. 1.9
 c. 3.3 d. none

151. PEI has tensile strength (in M Pa)
 a. 80 b. 100
 c. 105 * d. 30 - 40

152. Polypropylene has fracture toughness equals to (in KJ/m^2)
 a. 4 b. 1.9
 c. 3.3 d. none *

153. PEI has
 a. Tm° C = 343 b. Tm° C = 265
 c. Tm° C = 165 d. none *

154. The selection of carbon - carbon composites as a thermal protection system is based on
 a. maintenance of reproducible strength level at 1650^o C (3002^0 F)
 b. tolerance to impact damage
 c. all the above *
 d. none

155. PEEK has the following properties
 a. it offers good resistance to wear all chemicals.
 b. fracture toughness is higher than epoxies.
 c. both a and b *
 c. none

156. Commonly used reinforcements are
 a. glass b. carbon fibres
 c. both a and b * d. none

157. Applications for press forming are
   a. rubber assembly   b. reinforcement ribs *
   c. both a and b   d. none

158. The heat sink is made of
   a. rotors   b. stators
   c. rotors and stators *   d. none

159. The material, which can be used for a heat sink should have
   a. high specific heat
   b. resistance to thermal shock.
   c. both *
   d. none

160. Maximum allowed temperature for carbon - carbon is
   a. 2000^0 C   b. 3630^0 F
   c. both *   d. none

161. Kaolin (Hydrous aluminium silicate) is commonly known as
   a. smoke   b. clay *
   c. fobre   d. none

162. Commonly used fillers include
   a. mica   b. silica
   c. flake glass   d. all *

163. Fillers are added to improve
   a. hardness   b. stiffness
   c. impact strength   d. all *
   e. none

164. Hydrated alumina is frequently used when
   a. improved fire / smoke performance is required *.
   b. low cost is required.
   c. both
   d. none

165. Slip and blocking agents provides
   a. surface lubrication *
   b. improved processing characteristics
   c. none
   d. both a and b

166. Colorants are used to
   a. provide colour throughout the part. *
   b. improve smoke performance
   c. as inorganic filler
   d. all

167. Use of release agents in excess can
   a. reduce mechanical strength.
   b. affect adhesion characteristics
   c. all *
   d. none

168. Epoxy resin is cured
   a. by adding hardness *   b. by adding softner
   c. by colouring   d. none

169. MMC production has
   a. even distribution of fibres in the matrix. *
   b. hardener capability
   c. both
   d. none

170. Which of the aluminium alloys are used for higher tensile strength to weight ratio
   a. 201   b. 6061
   c. 1100   d. all *

171. Titanium alloys that are most useful in metal matrix composites are
   a. alpha alloy   b. beta alloy
   c. metastable beta alloy   d. all *

172. Aluminium alloy matrix composites are suited to applications
   a. below the temperature of 400^0 C.
   b. below the temperature of 750^0 F.
   c. below the temperature of 500^0 C.
   d. both a and b. *

■■■

CHAPTER - 78
PREPREGS

1. Prepregs used in aerospace applications require
   a. High performance
   b. High quality composites
   c. Both (a) and (b) *
   c. None

2. For aerospace application, the reinforcement in prepregs is
   a. Carbon fibre *
   b. Iron fibre
   c. Nylon fibre
   d. Lead fibre

3. Drape is the ability of the prepreg to
   a. Melt
   b. Bend *
   c. Both (a) and (b)
   d. None

4. Prepregs are available in
   a. Woven fabrics
   b. Unidirectional tape
   c. Multidirectional tape
   d. All *

5. Advantage of use of prepreg is
   a. Finest quality material *
   b. More shelf life
   c. Low cost
   d. All

6. The thermoset resin systems used to pre - impregnate the fibres are
   a. Epoxies and phenolics
   b. Epoxies and phenolics and polyesters
   c. Epoxies and polyamides
   d. Epoxies, phenolics, polyester and polyamides *

7. Prepregs are made by
   a. Solvent solution pre-impregnation process
   b. Hot melt pre-impregnation process
   c. Cold melt pre-impregnation process
   d. Both (a) and (b) *

8. Hot-melt pre-impregnation process provide following property / properties in prepreg
   a. Less drape and lower tack due to higher resin viscosity
   b. Better hot wet mechanical properties
   c. Less flow due to absence of volatiles
   d. All *

9. Solvent solution pre-impregnation process provides following characteristics in prepregs
   a. Lower hot-wet mechanical properties
   b. Low cost due to increased process speed
   c. Reduced resin waste
   d. All above *

10. Salient physical characteristics of prepregs include
    a. Absence of wrinkles
    b. Absence of waviness in the fibre orientation
    c. All the fibres should be completely wetted by the resin
    d. All above *

11. Mechanical properties of the prepreg include, determination of
    a. Longitudinal tension
    b. Longitudinal flexure
    c. Both (a) and (b) *
    d. None

12. The storing temperature of prepregs is
    a. -18^0C *
    b. -40^0C
    c. 0^0C
    d. 20^0C

13. The relative humidity of the working area for prepreg should
    a. Not exceed 70% *
    b. Not exceed 80%
    c. Not exceed 85%
    d. Not exceed 90%

14. The working temperature for prepreg is
    a. Between 18^0C and 32^0C
    b. Between 65^0F and 90^0F
    c. Both (a) and (b) *
    d. Between 80^0C and 100^0C

15. Prepreg storage requirements and shelf life are dependent on their
    a. Chemical properties
    b. Mechanical properties
    c. Storage environment
    d. All as per a., b, and c.*

16. Prepreg materials can be grouped into following category
    a. Bleed system
    b. Non -bleed system
    c. net resin content system
    d. All above *

■■■

CHAPTER - 79
CERAMICS AND CERAMIC MATRIX COMPOSITES

1. Coating of the Metal substrates by ceramic materials is another area which has been most exploited by the ---------------
   a. aerospace industries
   b. textile industries
   c. aerospace and textile industries *
   d. none

2. The word ceramic comes from the greek
   a. keramos *   b. karemos
   c. kauramos   d. none

3. Ceramic is an ----------------- product
   a. organic   b. metallic
   c. inorganic *   d. none

4. Ceramic is an ---------------- product
   a. organic   b. metallic
   c. nonmetallic *   d. none

5. Glass is not included among ceramics. This definition is given by
   a. U.S.   b. Japanese
   c. Indian   d. British *

6. Who admits glass also to the ceramic family
   a. U.S only   b. Japanese only
   c. British   d. U.S. and Japanese *

7. During manufacture or use ceramics are subjected to high temperature as such
   a. >100 C   b. >150 C
   c. >250 C   d. >540 C. *

8. The mineral raw materials used for traditional ceramics are mainly
   a. organic   b. metallic
   c. inorganic *   d. none.

9. Formula of Kaolin is
   a. $Al_3O_2\ SiO_2,2H_2O$
   b. $Al_2O_3 2SiO_2 2H_2O$ *
   c. $Al_2O_3SiO_2 2H_2O$
   d. none.

10. Formula of talc is
   a. $3MgO4SiO_2 2H_2O$ *
   b. $4MgO\ 3SiO_2\ 2H_2O$
   c. $2MgO3SiO_2H_2O$
   d. none

11. China Clay is predominantly
   a. Kaolin *   b. talc
   c. either (a) or (b)   d. none.

12. The purity in the production of alumina in Bayer process
   a. 97.6   b. 99.6 *
   c. 95.6   d. 94.6

13. Melting point of Zinconia is around
   a. 2700^0C *   b. 1500^0C
   c. 1450^0C d. none

14. Silicon Carbide is an ------------------ material
   a. natural material   b. artificial material *
   c. none

15. The melting point of Al_2O_3 in ^0C
   a. 2050 *   b. 1950
   c. 1850   d. none

16. The melting point of Beo
   a. 2550 *   b. 2450
   c. 2350   d. none

17. The melting point of CeO_2 in ^0C
   a. 2660   b. 2800
   c. 2660 - 2800 *   d. none

18. Melting point of Tic in ^0C
   a. 3200°C   b. 3100°C
   c. 3400-3500°C *   d. none

19. Melting point of MgO in ^0C
   a. 2500   b. 2600
   c. 2800 *   d. none.

20. Melting point of SiO_2 in ^0C
   a. 1620 *   b. 1520
   c. 1720   d. none.

21. Melting point of Cr_2O_3 in ^0C
   a. 1820 - 1900°C   b. 1800°C
   c. 1990 - 2260°C *   d. none.

22. Typical source diameter of conventional low - frequency ultrasonic system or X - ray system with conventional sources
   a. about 1.5 mm   b. about 2.5 mm
   c. about 0.5 mm *   d. none.

23. Ultrasonic microscopes uses
    a. sound - wave energy *
    b. light wave energy
    c. none.

24. First practical demonstration of ultrasonic microscopy was performed in
    a. 1949 b. 1959 *
    c. 1969 d. 1859

25. Early ultrasonic microscope typically operated at frequencies above
    a. 50 kHz b. 50 MHz
    c. 100 kHz d. 100 MHz *

26. CAUM system was introduced in
    a. 1893 b. 1983 *
    c. 1982 d. none

27. CAUM is
    a. Computer assisted ultrasonic microscope *
    b. computer applied universal microscope
    c. computer applied universal microscope
    d. computer applied ultrasonic microscope

28. Which one is more advantageous
    a. ultrasonic microscopy *
    b. conventional ultrasonic inspection
    c. any of the above
    d. none

29. The optimum plasma spraying speed lies between
    a. 200 to 250 cm / min
    b. 300 to 350 cm / min
    c. 100 to 180 cm / min *
    d. none

30. The self aligned specimen griping systems developed at ORNL in late
    a. 1970 b. 1980 *
    c. 1990 d. 1890

31. Which of the following materials does not exhibit high hardness
    a. silicon nitride b. silicon carbide
    c. boron carbide d. aluminium carbide *

32. Ceramics are used as insulating materials for -------- application
    a. low voltage b. medium voltage
    c. high voltage * d. none

33. After supercritical fluid extraction, ceramic parts are formed in low cost metal moulds at temperature below
    a. 1000°C b. 800°C
    c. 700°C * d. none

34. After moulding the 'green' silicon nitride is slowly pyrolysed at
    a. 100 °C b. 1000°C *
    c. 900 °C d. 200 °C

35. Heat resistance (°C) of ceramics are
    a. moderate b. excellent *
    c. poor d. generally inferior

36. Corrosion resistance of metals are
    a. excellent b. poor
    c. generally inferior *

37. Heat resistance of metals are
    a. excellent b. poor
    c. superior d. moderate *

38. Corrosion resistance of ceramics are
    a. excellent b. poor
    c. superior * d. none.

39. Toughness of metals are
    a. moderate b. excellent *
    c. poor d. none

40. Toughness of ceramics are
    a. moderate b. excellent
    c. poor * d. none

41. Hardness Kg / mm^2 of metals are
    a. thousand b. 1000 - 2000
    c. hundreds * d. none

42. Hardness of ceramics in Kg / mm^2.
    a. 100 b. 1500
    c. 2000 * d. none

43. Shock resistance (J / cm^2)of metals are in the range
    a. 20 - 30 b. 30 - 400
    c. 10 - 15 * d. none

44. Shock resistance (J / cm^2) of ceramics are in the range of
    a. 1 - 5 b. 1 - 3
    c. .01 - 0.1 * d. .02 - .5

45. Thermal shock resistance of metals are
    a. superior * b. poor
    c. generally inferior d. none

46. Thermal shock resistance of ceramics are
    a. superior b. generally inferior *
    c. excellent d. none

47. Crystal structure of Al_2O_3 is
    a. rubile teragonal b. hexagonal *
    c. amorphous d. cubic

48. Crystal structure of Cr_2O_3 is
    a. rubile teragonal b. hexagonal *
    c. amorphous d. cubic.

49. Crystal structure of Glass ceramics are
 a. amosphous * b. hexagonal
 c. variable d. none

50. Poisson's Ratio Glass ceramics are
 a. 0.24 * b. 0.29
 c. 0.35 d. 0.45

51. Crystal structure of Pyrex glass is
 a. variable b. amosphous *
 c. hexagonal d. none

52. Glass ceramics posses hardness of around
 a. 5 - 6 GPa b. 8 - 9 GPa
 c. 6 - 7 GPa * d. none

53. Transverse rupture strength (MPa) of Glass ceramics are
 a. 450 b. 350 *
 c. 550 d. above

54. Fracture toughness (MPa Om) of glass ceramics are
 a. 3.4 b. 2.4 *
 c. 5.4 d. none

55. Crystal structure of cemented carbides are
 a. variables * b. cubic
 c. hexagonal d. none

56. The mechanical and thermal properties of ceramics part are governed primarily by --------------------- if no gross exist
 a. microstructure * b. monostructure
 c. any of the above d. none

57. Wear resistance is directly related with ----------
 a. toughness b. brightness
 c. hardness * d. none.

58. The requirement of substrate materials for electronic circuit is
 a. high thermal conductivity
 b. superior insulation
 c. low dielectric loss
 d. all of the above *

59 Which of the following materials exhibit high hardness
 a. silicon nitride b. silicon carbide
 c. boron carbide d. all the above *

60. Tools which are used most frequently in grinding are
 a. iron b. diamond *
 c. gold d. none

61. Lapping a process is used
 a. for cutting ceramics
 b. to finish ceramics product *
 c. to change the shape of the ceramics product
 d. none

62. Lapping process is
 a. costly b. economical *
 c. variable d. none

63. Which of the following process is done latter
 a. lapping b. polishing *
 c. any of the above

64. How amny times the cutting tools should be hard than the material to be cut
 a. twice b. three
 c. four * d. five

65. Which material is used for cutting ceramics
 a. diamond * b. gold
 c. iron d. bronze

■■■

CHAPTER - 80
AEROSPACE MATERIALS
METAL MATRIX COMPOSITES

1. A composite material can be defined as a macroscopic combination of
   a. two or more distinct materials *
   b. distinct materials
   c. any material
   d. none of these

2. composites materials generally consists of a bulk material which is called as :
   a. matrix * b. determinants
   c. none of these

3. Composite materials are usually divided into
   a. two broad groups
   b. three broad groups *
   c. four broad groups
   d. none

4. Separate materials forming the composite must be combined
   a. two dimentionally
   b. one dimentionally
   c. three dimentionally *
   d. none

5. The smallest radius of curvature that the dislocation can be bent under the influence of an internal stress field,g i is

   a. $R = \frac{G_m \bar{b}}{2\gamma i}$ * b. $G_m = \frac{R \bar{b}}{2\gamma i}$

   c. $R = \frac{G_m \gamma i}{2\bar{b}}$ d. None of these

6. At which temperature the oxidation barrier presents a major problem in the development of ductile structural materials ?
   a. about 500°C b. about 1000°C *
   c. about 1500°C d none

7. Density (g\cm^2) of Boron, 100 μm is
   a. 2.57 * b. 2.49
   c. 1.75 d. none

8. Density (g\cm^2) of Boron, 140 μm is
   a. 2.57 b. 2.49 *
   c. 1.75 d. none

9. Density (g\cm^2) of Carbon,AS-4
   a. 2.49 b. 1.75 *
   c. 2.54 d. none

10. Density of E-glass in g\cm^2
    a. 2.49 b. 1.75
    c. 2.54 * d. none.

11. Density of Aramid in g\cm^2
    a. 1.75 b. 2.54
    c. 1.44 * d. none

12. Density of Aramid in g\cm^2
    a. 2.54 b. 1.44 *
    c. 3.0 d. none

13. Density of SiC in g\cm^2
    a. 2.54 b. 1.44
    c. 3.0 * d. none

14. Tenstile strength of Boron ,100 μm
    a. 3.6 * b. 3.1
    c. 3.4 d. none

15. Tenstile strength of Boron ,140 μm
    a. 3.6 * b. 3.1
    c. 3.4 d. none

16. Tenstile strength of carbon,AS-4
    a. 3.6 b. 3.1 *
    c. 3.4 d. none

17. Tenstile strength of E-glass
    a. 3.6 * b. 3.1
    c. 3.4 d. none

18. Tenstile strength of Aramid
    a. 3.6 * b. 3.1
    c. 3.4 d. none

19. Tenstile strength of Sic
    a. 3.6 b. 3.1
    c. 3.9 * d. none

20. Modulus of elasticity of Boron ,100 μm
    a. 400 * b. 600
    c. 221 d. none

21. Modulus of elasticity of Boron ,140 μm
    a. 400 * b. 600
    c. 221 d. none

22. Modulus of elasticity of carbon ,AS-4
    a. 400 b. 221 *
    c. 69 d. none

23. Modulus of elasticity of E-glass
a. 400 b. 221
c. 69 * d. none

24. Modulus of elasticity of Aramid
a. 400 b. 221
c. 124 * d. none

25. Modulus of elasticity of SiC
a. 400 * b. 124
c. 69 d. none

26. Approx. cost in ($/kg) of Boron ,100 μm
a. 700 * b. 600
c. 220 d. none

27. Approx. cost in ($/kg) of Boron ,140 μm
a. 600 b. 700 *
c. 220 d. none

28. Approx. cost in ($/kg) of carbon ,AS-4
a. 700 b. 65 *
c. 5.5 d. none

29. Approx. cost in ($/kg) of E-glass
a. 700 b. 65
c. 5.5 d. none *

30. Approx. cost in ($/kg) of Aramid
a. 65 b. 5.5 *
c. 45 d. none

31. Approx. cost in ($/kg) of SiC
a. 65 b. 5.5
c. 45 * d. 220

32. Which of the following fibres offers the highest modulus & highest strength of all reinforcing fibres
a. graphite fibres * b. glass fibres
c. wood dust fibres d. none

33. Co-efficient of thermal expansion of aluminium matrix
a. 23.9×10^{-6} * b. 8.4×10^{-6}
c. 11.7×10^{-6} d. none

34. Co-efficient of thermal expansion of titanium matrix
a. 23.9×10^{-6} b. 8.4×10^{-6} *
c. 11.7×10^{-6} d. none

35. Co-effiecient of thermal expansion of iron matrix
a. 23.9×10^{-6} b. 8.4×10^{-6}
c. 11.7×10^{-6} * d. none

36. Co-effiecient of thermal expansion of Nickel matrix
a. 23.9×10^{-6} b. 8.4×10^{-6}
c. 13.3×10^{-6} * d. none

37. Co-effiecient of thermal expansion of Boron filament
a. 6.3×10^{-6} b. 6.4×10^{-6} *
c. 4×10^{-6} d. none

38. Co-efficient of thermal expansion of borsic filament
a. 6.3×10^{-6} * b. 6.5×10^{-6}
c. 4×10^{-6} d. none

39. Co-efficient of thermal expansion of silicon carbide filament
a. 6.3×10^{-6} b. 4×10^{-6} *
c. 8.3×10^{-6} d. none

40. Co-efficient of thermal expansion of Alumina filament
a. 6.3×10^{-6} b. 4×10^{-6}
c. 8.3×10^{-6} * d. none

41. Which of the following titanium matrix composites has moderate specific strength
a. Beryllium b. molybdenum *
c. boron d. silicon carbide

42. Which of the following matrix composites has moderate specific strength
a. silicon carbide b. boron
c. molybdenum d. alumina *

43. Which of the following matrix composites has fair ductility
a. Beryllium b. molybdenum
c. boron d. alumina *

44. Which of the following matrix composites has very difficult fabricability
a. alumina * b. boron
c. beryllium d. none

45. Melting point (°C)of Re metal
a. 3180 * b. 3000
c. 2500 d. none

46. Melting point (°C)of Os metal
a. 3180 b. 3000 *
c. 2500 d. none

47. Melting point (°C)of Ru metal
a. 3180 b. 3000
c. 2500 * d. none

48. Melting point (°C)of Ir metal
a. 3180 b. 3000
c. 2440 * d. none

49. Melting point (°C)of Rh metal
a. 1966 * b. 2500
c. 3000 d. none

50. Melting point (°C)of Pt metal
a. 1773 * b. 2500
c. 3000 d. none

51. Melting point (°C)of Pd metal
a. 1773 b. 1550 *
c. 1700 d. none

52. Melting point (°C)of Co metal
    a. 1495 * b. 2440
    c. 2500 d. none

53. Melting point (°C)of Ni metal
    a. 1452 * b. 1495
    c. 1550 d. none

54. Melting Point of Cu metal in (°C)
    a. 1083 * b. 1452
    c. 1495 d. none

55. Eutectic Point of Ni metal in (°C)
    a. 1309 b. 1318 *
    c. 1504 d. none

56. Eutectic Point of Co metal in (°C)
    a. 1309 * b. 1736
    c. 1504 d. none

57. Eutectic Point of Pd metal in (°C)
    a. 1736 b. 1504 *
    c. 1309 d. none

58. Eutectic Point of Pt metal in (°C)
    a. 1504 b. 1736 *
    c. 1309 d. none

59. Eutectic Point of Rh metal in (°C)
    a. 1694 * b. 1736
    c. 1504 d. none

60. Eutectic Point of Ir metal in (°C)
    a. 2296 * b. 1942
    c. 2732 d. none

61. Eutectic Point of Ru metal in (°C)
    a. 2732 b. 2762
    c. 1942 * d. none

62. Eutectic Point of Os metal in (°C)
    a. 2486 b. 2732 *
    c. 1942 d. none

63. Eutectic Point of Re metal in (°C)
    a. 2486 * b. 2732
    c. 1942 d. none

64. Boron/ aluminium composites are difficult to machine because of high
    a. Ductility b. Hardness *
    c. toughness d. none

65. Cold/rolling of the composites has been used to increase the
    a. axial strength
    b. transverse strength
    c. both a. & b. *
    d. none

66. Composite materials exhibit very complex failure mechanisms under
    a. static loading
    b. fatigue loading *
    c. both a. & b.
    d. none

67. Creep rates of Boron uncoated filament at 538°C
    a. 1×10^{-5} * b. 4.5×10^{-4}
    c. $.5 \times 10^{-6}$ d. none

68. Creep rates (cm/cm/hr)of uncoated boron filament at 815°C is
    a. 1×10^{-5} b. 4.5×10^{-4} *
    c. $.5 \times 10^{-6}$ d. none

69. Creep rates (cm/cm/hr)of coated(withAl)boron filament at 260°C is
    a. 1×10^{-5} b. 4.5×10^{-4}
    c. $.5 \times 10^{-6}$ * d. none

70. The degradation of fibre is most important consideration during
    a. Welding of boron / aluminium *
    b. Brazing
    c. soldering
    d. none

71. Melting Point of Zinc/ aluminium is
    a. 380°C * b. 300°C
    c. 450°C d. none

72. The joining technology is mostly based on
    a. matrix material * b. non matrix material
    c. both a. & b. d. none

73. Unidirectional reinforcement is a part of
    a. continuous fibre -reinforced composites *
    b. laminates
    c. hybrids
    d. none

74. Laminates is a part of
    a. multilayered (angle-ply) composites *
    b. Hybrids
    c. Random orientation
    d. none

75. Preferred orientation is a part of
    a. laminates
    b. hybrids
    c. random orientation
    d. discontinuous fibre -reinforced composites *

76. Random orientation is a part of
    a. particle reinforced composites *
    b. laminates
    c. hybrids
    d. none

77. The bounding in laminated composites is done with the
a. same material *
b. different material
c. none

78. Most composites used in structural application are
a. Single layered b. double layered
c. multi layered * d. none

79. Particulate composite consists of
a. one or more materials *
b. one or more substance
c. two materials
d. none

80. A Laminae is a
a. Flat surface * b. Sharp surface
c. Linear surface d. none

81. Laminates are
a. Stacks of laminae
b. combinations of laminae
c. either (a) or (b) *
d. none

82. Copper \ tungsten composite system interface belongs to the
a. class I * b. class II
c. class III d. none

83. Silver \ alumina belongs to
a. class I * b. class II
c. class III d. none

84. Copper / alumina belongs to
a. class I * b. class II
c. class III d. none

85. Magnesium / boron belongs to
a. class I * b. class II
c. class III d. none

86. Nickel \carbon belongs to
a. class I b. class II *
c. class III d. none

87. Columbium / tungsten belongs to
a. class I b. class II *
c. class III d. none

88. Titanium /boron belongs to
a. class I
b. class II
c. class III *

89. Titanium alumina belongs to
a. class I
b. class II
c. class III *

90. Aluminium / silica belongs to
a. class I
b. class II
c. class III *

91. Nickel / tungsten belongs to
a. class I
b. class II *
c. class III

92. In which of the class filaments and matrix mutually non reactive and insoluble.
a. class I *
b. class II
c. class III

93. In which of the class filaments and matrix mutually non reactive and soluble.
a. class I
b. class II *
c. class III

94. In which of the class filaments and matrix react to form compound or compounds at interface
a. class I b. class II
c. class III *

95. The method of plasma spray bonding to prepare ___________ tapes
a. Mono layer * b. Multi layer
c. none

96. Primarily ,with the initial application of load both fibre & matrix deform ______________
a. elastically * b. plastically
c. none

97. The ____________ stresses that result from the consolidation process arise because of the thermal expansion mismatch of the two phases
a. transverse
b. longitudinal *
c. residual
d. none

98. The creep resistance of unidirectionally reinforced metals loaded __________ to the filaments
a. parallel * b. series
c. any of the above d. none.

■■■

CHAPTER - 81
ENGINEERING POLYMERS

1. The greek means of the word 'mer' is
a. rubber b. unit *
c. mass d. none

2. Synthetic names of the polymer are
a. widely used b. not widely used *
c. rare used d. never used

3. Synthetic names of the polymers are not widly used due to its
a. complication * b. absurdness
c. restricted products d. none

4. The range of the molecular weight of chains
a. 1000 - 10,000 b. 10,000 - 1,000,000 *
c. 100 - 10,000 d. none

5. The majority of polymers are
a. inorganics b. organics *
c. either a. or b. d. none

6. Abreviation PVC is used for the polymers
a. polyethylene b. polypropylene
c. polyvinyle chloride * d. none

7. Abreviation PE is used for the polymer
a. polyethylene * b. polyvinyle chloride
c. polypropylene d. none

8. Abreviation PAN is used for the polymer
a. polypropylene b. polysyrene
c. polycrylonitrile * d. none

9. In plastics, the long chain molecules are ------------- oriented
a. randomly * b. symetrically
c. asymetrically d. none

10. Thermoplastic polymers are
a. easily mouldable * b. not easily mouldable
c. mouldable d. none.

11. Which polymers are used in making moulded parts for industrial euipments
a. poyacetal * b. polyurethane
c. cellulose d. none

12. Which polymers are used in making electrical equipment
a. poyacetal
b. polyamide
c. cellulose
d. phenol - farmaldehyde *

13. Glass transition temparature of poly(ethylene)
a. -20 °C * b. +2 °C
c. +5 °C d. +80 °C.

14. Glass transition temparature of poly(propylene)
a. +20 °C b. -20 °C
c. +5 °C * d. -5 °C

15. Glass transition temp of PVC
a.+20°C b. -20°C
c. +80°C * d. none

16. Glass transition temparature of PTFB
a. +115°C * b. -105°C
c. -115°C d. none

17. Which of the following polymers have flexible backbone
a. poly (ethylene) * b. poly (propylene)
c. PVC d. PTFE

18. Which of the following polymers have very stiff backbone
a. poly (ethylene) b. poly (propylene)
c. PVC d. PTFC *

19. Conductivity of copper
a. $8X10^5 Scm^{-1}$ * b. $4X10^5 Scm^{-1}$
c. $8X10^3 Scm^{-1}$ d. none

20. Which of the following materials have high conductivity
a. copper * b. iron
c. mercury d. polyacetylene

21. Which of the following materials have low conductivity
a. copper b. iron
c. mercury d. polyacetylene *

22. Conductivity of mercury is
a. $1X10^5$ b. $1X10^4$ *
c. $1X10^3$ d. $2X10^6$

23. Conductivity of iron is
a. $1X10^4$ b. $1X10^5$ *
c. $1X10^6$ d. $1X10^7$

24. Cross linked polymers are usually ------------ than corresponding linear product
a. stronger * b. weaker
c. can't say d. none

25. Polyamide is used for making
a. cotton for fabrics
b. elastomeric tubing
c. foam and fibres
d. moulded part of high temparature electrical applications *

26. Which of the following polymers is used in making elastomeric tubing, foam and fibres
a. polyacetal b. polymide
c. polyester * d. polyurethane

27. Which of the following polymers is used for making Nylon, Silk, fir fabrics etc
a. polyacetal b. polymide *
c. polyester d. polyurethane

28. Which of the following polymers is used in making silicon rubbers for gakcerts, adhesives,
a. cellulose b. phenol formaldehyde
c. polyurethane d. polysiloxane *

29. Cellulose is used in making
a. cotton fir fabrics *
b. electrical equipment
c. elastomeric tubing, foam and fibres
d. none

30. Abreviation for polymethyl - metha acrylate
a. PMMA * b. PMA
c. PAMM d. PAN

31. Polyethylene is a polymers of
a. vinyle chloride b. ethylene *
c. propylene d. none

32. Polystryrene is a polymer of
a. styrene * b. acrylonitrile
c. vinylacelate d. propylene

33. Polyvinleidene is a polymer of
a. vinyle chloride b. vinylidene chloride *
c. vinyl acetate d. none

34. PVAC is a abreviation of
a. polyvinyle acetate * b. polyisobutylene
c. polycrylonitrile d. polystyrene

35. 'Mer' is a -------------- word
a. Greek * b. Amercian
c. British d. Roman

36. Condensation Polymerisation is a method for forming --------------------
a. polymers * b. fabrics
c. rayon d. none

37. In the high pressure process for the preparation of poly (ethylene) the pressure used is
a. 50 - 100 MPa b. 100 - 150 MPa *
c. 150 - 200 MPa d. 100 - 300 MPa

38. The temparature of the above process is
a. 80 - 150 °C * b. 80 - 300 °C
c. 200 - 300 °C d. 250 - 300 °C

39. Commercial Poly(propylene) is usually about ------------- isotactic
a. 45 - 50 % * b. 55 - 70 %
c. 75 - 80 % d. 90 - 95 %

40. Poly (propylene) has a ---------------------- density
a. lower * b. higher
c. medium d. very higher

41. Which of the following are the properties of poly (propylene)
a. it has a lower density *
b. it has higher softening point
c. it is not susceptible to environmental stress cracking
d. all the above

42 Poly(styrene) have the following property
a. excellent colour range b. transparency
c. rigidity d. all the above *

43. The monomer, stryrene is derivative of --------------
a. benzene * b. mithen
c. ethen d. none

44. Poly (stryrene) is -------------------- in nature
a. bittle * b. ductile
c. soft d. hard

45. To improve the mechanical strength of the Poly (styrene) the following modifications are done
a. co-polymerisation
b. the addition of rubbery fillers
c. both a. & b. *
d. none

46. The successful co-polymers of poly (styrene) contain
a. butadiene * b. mithen
c. carbon d. ethen

47. High impact poly (styrene) have --------------- mechanical properties
a. high b. low
c. improved * d. medium

48. The commercial production of Poly (ethylene) was started in
a. 1839 b. 1939 *
c. 1849 d. 1969

49. The following are the industrial routes for preparation of poly (ethylene)
a. high pressure processes
b. ziegler process
c. the phillips process
d. all the above *

50. Which of the following routes generally yields lower density polyethylenes
    a. high pressure process *
    b. ziegler process
    c. the phillips process
    d. the standard oil

51. Which of the following process yield high density poly (ethylene)
    a. the phillips process
    b. the standard oil process
    c. both a. & b. *
    d. none of these

52. Which of the following process yield intermediate density poly (ethylene)
    a. high pressure process
    b. ziegler process *
    c. the phillips process
    d. the standard process

53. Which of the following are the properties of poly (ethelene)
    a. waxy solid
    b. relatively low cost
    c. good chemical resistance
    d. all the above *

54. Isotactic have ------------------ rigidity
    a. low b. greater *
    c. medium d. can't say

55. Isotactic have ------------------------ hardness
    a. low b. greater *
    c. medium d. can't say

56. IUPAC name of poly (propylene)
    a. polypropene * b. poly
    c. propene d. none

57. Which polymer can withstand the effects of exposure to boiling water
    a. poly (propylene) * b. poly(ethelene)
    c. both a. & b. d. none

58. Which polymer is not susceptile to environmental stress cracking
    a. poly (ethelene) * b. poly(propylene)
    c. both a. & b. d. none.

59. Which of the following polymer possibly exist in two form
    a. poly (ethelene) b. poly (propylene) *
    c. both a. & b. d. none

60. The most important of commercial acrylic polymers is
    a. poly (ethelene)
    b. poly (propylene)
    c. poly (methyl methacrylate) *
    d. none

61. Poly (methyl methacrylate) is derived from -----------
    a. poly (acrylic acid) * b. poly (propylen)
    c. poly (ethelen) d. none

62. The insulating properties of PMMA are
    a. good b. poor *
    c. intermediate d. very good

63. PMMA is a ----------------
    a. transparent b. obaque
    c. glassy d. both (a) & (c) *

64. PMMA is used in
    a. display signs
    b. street lamp fittings
    c. ceiling lights in factories
    d. all the above *

65. The standard material used for automobile rear lamp housings
    a. poly (methyl methacrylate) *
    b. poly (ethelene)
    c. poly (propylene)
    d. none of these.

66. Which of the followings are not the most important polymers
    a. poly (ethelene)
    b. poly (styrene)
    c. poly (vinyl chroride)
    d. poly (propylene) *

67. Which of the followings are the properties of poly (vinyl chloride)
    a. tough
    b. strong thermoplastic
    c. excellent combination of physical and electrical properties
    d. all the above *

68. Rigid PVC products consist of
    a. homopolymer b. copolymer
    c. poly blends d. all the above *

69. PVC are commonly used in the manufacturing of
    a. phonograph records
    b. pipe
    c. chemically resistant liners
    d. all the above *

70. Uncompounded PVC is
    a. colourless
    b. rigid
    c. poor stability towards heat and light
    d. all the above *

71. The name Nylon was given by
    a. U.S b. Amercian *
    c. British d. Japanese.

72. Nylon's have the following properties
a. high impact strength
b. toughness
c. flexibility
d. all the above *

73. Commertical production of nylon 6,6 began in
a. 1938 * b. 1838
c. 1819 d. 1919

74. Nylons tend to show -------------- resistance to organic solvents
a. very poor b. very good *
c. poor d. intermediate

75. Nylons are ------------------ by concentrated mineral
a. readily attacked * b. repulsed
c. none

76. Nylon's can be
a. injection moulded *
b. cannot be moulded
c. some of the nylons are injection moulded
d. none

77. Cellulose is ---------------- polymer
a. linear * b. non linear
c. can't say d. none

78. Startch occurs in
a. roots b. seeds *
c. fruits d. all the above

79. The principle source of starch is
a. corn * b. wheat
c. potatoes d. rice

80. Amylopectin presents usually -------------------- of total mass of the starch
a. 70 - 85 % * b. 60 - 70%
c. 65 - 75% d. 45 - 65%

81. Rubber is obtained from the trees
a. Heveabrasilicon * b. magnifera India
c. Ucaliptus Monifera d. Chamaik grasura.

82. Which of the following substance most widely used for the vulcanisation process
a. phosphorus b. sulphur *
c. carbon d. none of these

83. A more heavily crosslinked material can be obtained by increasing ---------------- in the mixture
a. phosphorus * b. sulphur
c. carbon d. none of these

84. The mixture of raw rubber and the sulphur is heated at
a. 100 ^{o}C b. 150 ^{o}C *
c. 50 & ^{o}C d. 200 ^{o}C

85. The heating of the above mixture gives a hard thermoset material which is
a. plastic b. elastic
c. not at all elastic * d. none of these

86. Proteins are of linear --------------------
a. polyamides * b. polyethelene
c. polypropelene d. none

87. Proteins are a group of ----------------- substances
a. macromolecular * b. micromolecular
c. either a. or b. d. none

88. Copolymerisation ---------------- the melting print
a. lower * b. increases
c. does not effect on d. none

89. Crystallisation of a rubbery polymer due to stretching is
a. not permanent * b. permanent
c. artifical d. none

90. Hardness is the resistance of a material to -------------
a. local deforrmation * b. average deformation
c. heavy deformation d. none

91. Density is usually expressed in -------------
a. kg / m^2 b. gm / cm^2
c. gm / cm^3 * d. none

92. Specific gravity given as
a. $\frac{\text{weight}}{\text{volume}}$ * b. $\frac{\text{mass}}{\text{volume}}$
c. $\frac{\text{mass}}{\text{area}}$ d. none of these

93. Tensile strength or tenacity is the stress at the --------- point
a. breaking * b. pour
c. elastic d. yield

94. Impact test defines as the
a. toughness * b. hardness
c. ductibility d. none of these

95. Strain is given by
a. $\frac{\text{changedconfiguration}}{\text{originalconfiguration}}$ *
b. $\frac{\text{originalconfiguration}}{\text{changedconfiguration}}$
c. both a. & b.
d. none

96. Extrusion, calendering are the techniques for
a. coating * b. casting
c. rational casting d. none of these

97. In injection mouldings moulds are made of
    a. iron * b. steel
    c. carbon d. plastics

98. The injection moulding process can be used to mould article in the range of :
    a. 10g - 10kg b. 28g - 13.5 kg or more *
    c. 5g - 35.5 kg d. any article

99. Commercial designation of rigid polyrethane foam
    a. rigid polyrethane foam *
    b. maltoprene
    c. insulator bush - PRP - 15 - 03
    d. none of these

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CHAPTER - 82
POLYMER MATRIX COMPOSITS

1. In structural polymer composites , the fibre is stiffer and _____________ than the continuous matrix phase
   a. weaker b. stronger *
   c. longer d. shorter

2. The carbon fibre composites are extensively used in ___________
   a. aerospace & sporting material *
   b. domestic items
   c. industrial equipments
   d. none

3. Which of the following composites are being used mostly in the chemical industries & marine applications.
   a. carbon fibre b. glass fibre *
   c. both a. & b. d. none

4. Glass fibre have _____________resistance to corrosion
   a. inferior b. low
   c. less d. superior *

5. Which of the following fibres are used for infrastructural application.
   a. carbon fibre b. glass fibre
   c. both a. & b. * d. none

6. Which percentage of volume production of cars & civil aircraft contains composites material
   a. more than 10 % *
   b. more than 5 %
   c. more than 30 %
   d. none

7. Which percentage of volume production of military aircraft contains composites material
   a. more than 75 % * b. lese than 75 %
   c. less than 50 % d. none

8. Which of the following uses composites material as low as 1% by weight
   a. military aircraft b. civil aircraft
   c. gas industries * d. none

9. Which of the following glass fibre resin composites have highest density
   a. unidirectional roving *
   b. woven glass fabric
   c. chopped strand mat
   d. sheet moulding compound R50

10. Which of the following glass fibre resin composites have highest tenstile strength
    a. unidirectional roving *
    b. woven glass fabric
    c. chopped strand mat
    d. sheet moulding compound R50

11. Which of the following glass fibre resin composites have highest tenstile modulus
    a. unidirectional roving *
    b. woven glass fabric
    c. chopped strand mat
    d. sheet moulding compound R50

12. A fibre reinforced composites consists of the following constituents
    a. matrix b. fibres
    c. interface d. all of the above *

13. The purpose of the composite matrix.
    a. to bind the fibre together
    b. to separate the fibre so that they can act as separate entities
    c. to protect the reinforcement filament
    d. all of the above *

14. Which of the following are true for polyester fibres
    a. used in manufacture of surfacing tissues
    b. used for structural reinforcement to produce laminates with very high impact resistance
    c. excellent chemical resistance
    d. all of the above *

15. Which of the following one is applicable for jute fibre
    a. cheap b. readily available
    c. naturally occuring d. all of the above *

16. Which of the following fibres are used in woven & yarn form.
    a. polyester b. jute fibre *
    c. sisal fibres d. nylon fibre

17. Which of the following is / are applicable for sisal fibres
    a. these are inexpensive
    b. naturally occuring
    c. used in phenolic based dough moulding components
    d. all of the above *

18. Which of the following is / are used for reinforcing epoxy resins
    a. nylon fibre * b. sisal fibre
    c. jute fibre d. polyester fibre

19. Which of the following fibres are used in combination with glass reinforcement
 a. nylon fibre * b. sisal fibre
 c. jute fibre d. polyester fibre

20. Which of the following fibres have excellent chemical resistance
 a. jute fibre b. sisal fibre
 c. polyester fibre * d. nylon fibre

21. Diameter of carbon - fibres is
 a. 5 - 7 microns * b. 25 -50 microns
 c. 20- 25 microns d. none

22. Centrifugal casting is used to produce __________ articles
 a. solid b. hollow *
 c. sphere d. liquid

23. Injection moulding technique is used for manufacture of most __________ component
 a. thermoplastic * b. polyesterin
 c. carbon fibres d. none

24. Several every product such as electric plugs & sockets are manufactured by
 a. injection moulding *
 b. heat moulding
 c. glass moulding
 d. none

25. The process in which the fibre & matrix are pulled through a die is called
 a. tube rolling b. pultrusion *
 c. braiding d. none

26. Which of the following composites are being considered for usage in reinforced concrete
 a. carbon fibre b. glass fibre
 c. both a. & b. * d. none

27. The usage of composites is quite low in the following
 a. millitary aircraft
 b. automobile industry *
 c. civil aircraft
 d. none

28. The aerospace industry has been the major factor in the development &application of
 a. carbon * b. aramid
 c. boron d. all of the above

29. Boron is the ____________ element in the periodic table
 a. 2^{nd} b. 3^{rd} *
 c. 4^{th} d. 5^{th}

30. Beryllium is __________ in nature
 a. fragile * b. solid
 c. liquid d. none

31. Aramid is a ___________ fibre
 a. Natural b. Man made *
 c. artificial d. none

32. Aramid is a ___________ fibre
 a. organic b. inorganic *
 c. both a. & b. d. none

33. The main feature of polyaramid fibre is
 a. high tenstile strength
 b. low density
 c. high specific strength
 d. all of the above *

34. Which of the following fibres have relatively large diameters
 a. carbon fibres b. glass fibres
 c. boron fibres * d. none

35. Range of Diameters of boron fibres in the order of
 a. 100 microns b. 200 microns *
 c. 50 microns d. 150 microns

36. Which of the following fibres are expensive
 a. carbon fibre b. glass fibre
 c. boron fibre * d. all of the above

37. Which of the following fibres have greater diameter
 a. carbon fibre b. boron fibre *
 c. glass fibre d. none

38. Which of the following fibres have smaller diameter
 a. carbon fibre * b. boron fibre
 c. glass fibre d. none

39. Specific tenstile strength of which of the following fibres is highest
 a. polyaramid * b. carbon
 c. glass d. nylon

40. Specific tenstile strength of which the following fibres is highest
 a. carbon * b. glass
 c. nylon d. polyester

41. Specific tenstile strength of which the following fibres is lowest
 a. steel * b. polyester
 c. nylon d. glass

42. Which of the following fibres have lowest tenstile strength
 a. polyaramid b. carbon
 c. glass * d. nylon

43. Which of the following fibres is / are most widely used
 a. polyaramid b. carbon
 c.glass * d. steel

44. Polyaramid thermoset resins are available with maximum hot/ wet in service temperature of
 a. 200-250°C b. 260-320°C *
 c. 100-150°C d. 200-400°C

45. Which of the following carbon fibres have highest tenstile strength (mfa)
a. polyacrylonitrile * b. cellulose
c. lignin d. hydrocarbon pitch

46. Tenstile modulus of which carbon fibres is highest
a. polyacrylonitrile b. cellulose
c. lignin * d. hydrocarbon pitch

47. Elongation of which carbon fibres is highest
a. polyacrylonitrile * b. cellulose
c. lignin d. hydrocarbon pitch

48. Diameter of which of the carbon fibre is highest
a. polyacrylonitrile b. cellulose
c. lignin * d. hydrocarbon pitch

49. Specific gravity of which of the carbon fibres is highest
a. polyacrylonitrile * b. cellulose
c. lignin d. hydrocarbon pitch

50. Elongation of which of the carbon fibres is minimum
a. polyacrylonitrile b. cellulose *
c. lignin d. hydrocarbon pitch

51. Which of the following are the properties of glass fibres
a. Relatively low stiftness
b. high elongation
c. moderate strength
d. all of the above *

52. Glass fibre in most composite primarily used with
a. polyester b. epoxy resins
c. polyester & epoxy resins *
d. none

53. Which of the following is a chemical resistant glass
a. A-glass b. C-glass *
c. S-glass d. E-glass

54. Which of the following is a comparatively cheaper
a. A-glass b. C-glass
c. S-glass d. E-glass *

55. Which of the following fibres provides good electrical , mechanical & chemical resistant properties
a. A-glass b. C-glass
c. S-glass d. E-glass *

56. Percentage of Sio_2 is highest in which of the following fibres
a. E-glass b. C-glass
c. S-glass d. A-glass *

57. Percentage of Sio_2 contents lowest in which of the fibres
a. E-glass * b. C-glass
c. S-glass d. A-glass

58. Which of the fibres contains Al_2O_3 & in highest percentage
a. E-glass * b. C-glass
c. S-glass d. A-glass

59. Which of the fibres contains Al_2O_3 & in lowest percentage
a. E-glass b. C-glass *
c. S-glass d. A-glass

60. Which of the fibres contains CaO & MgO in highest percentage
a. E-glass * b. C-glass
c. S-glass d. A-glass

61. Which of the fibres contains CaO & MgO in lowest percentage
a. E-glass b. C-glass
c. S-glass * d. A-glass.

62. Percentage of B_2O_3 is highest in which of the following fibres
a. E-glass * b. C-glass
c. can't say d. none.

63. Percentage of B_2O_3 is lowest in which of the following fibres
a. E-glass b. C-glass *
c. can't say d. none

64. Percentage of Na_2O & K_2O is highest in which of the following fibres
a. E-glass b. C-glass
c. A-glass * d. none

65. Percentage of Na_2O & K_2O is lowest in which of the following fibres
a. E-glass * b. C-glass
c. A-glass d. none

66. Tenstile strength of which of the fibres is highest
a. glass b. polyaramid *
c. carbon d. jute

67. Tenstile modulus of which of the fibres is highest
a. glass b. polyaramid
c. carbon * d. jute

68. Percentage elongation of which of the fibre is highest
a. glass * b. polyaramid
c. carbon d. jute

69. Specific gravity of which of the fibres is highest
a. glass * b. polyaramid
c. carbon d. jute

70. Co-efficient of thermal expansion is highest for the fibre
a. glass * b. polyaramid
c. carbon d. jute

71. Aramid fibre is used ____________ performance replacement for glass
a. high * b. low
c. medium d. none

72. Which of the following are glycols
    a. propylene b. ethylene
    c. diethylene d. all of the above *

73. Which of the following are saturated acids
    a. orthophthalic b. isophthalic
    c. terephthalic d. all of the above *

74. Which of the following are un satmated acids
    a. Maleic
    b. fumaric
    c. Maleic in the form of maleic anhydride
    d. all of the above *

75. The typical cure temprature for the epoxies is in the range of
    a. 121°C-177°C * b. 130°C-140°C
    c. 151°C-161°C d. 161°C-175°C

76. The glass - transition temprature (Tg) of epoxy resins ___________ due to moisture absorption
    a. increases * b. decreases
    c. remains constant d. none

77. Fibre diameter of which of the following fibres is highest
    a. E-glass b. S-glass
    c. polyethylene d. aramid *

78. Fibre diameter of which of the following fibres is highest
    a. HS carbon , T300 b. AS_4 carbon
    c. IM7 carbon d. GY80 carbon *

79. Fibre density of which of the following fibres is highest
    a. E-glass * b. S-glass
    c. polyethylene d. aramid

80. Fibre density of which of the following fibres is highest
    a. boron * b. silicon carbide
    c. GY80 carbon d. AS4 carbon

81. Tensile strength of which of the following fibres is highest
    a. E-glass b. S-glass *
    c. polyethylene d. aramid

82. Tensile strength of which of the following fibres is highest
    a. silicon carbide b. boron
    c. GY80 carbon d. XUHM carbon *

83. Tensile modulus of which of the following fibres is highest
    a. E-glass b. S-glass
    c. polyethylene * d. none

84. Tensile modulus of which of the following fibres is highest
    a. Silicon carbide * b. boron
    c. aramid d. S-glass

85. Which of the following fibre have highest tensile strength
    a. polyethylene b. aramid
    c. HS carbon,T300 d. AS4 carbon *

86. Objective of the cure process is to ___________ volatiles & excess air
    a. increase b. decrease
    c. remove * d. none

87. Which process is used to make tanks fibre & poles for street lighting etc.
    a. centrifugal casting * b. cold press
    c. closed mould process d. none

88. Pressure used in pressure bag moulding is upto
    a. 0.3 mPa * b. 0.45 mPa
    c. .02 mPa d. none

89. Combination of vacuum & pressure bag moulding is called
    a. auto clave * b. hot press
    c. cold press d. centrifugal casting

90. In cold press method hydraulic press exerting a pressure of at least
    a. 0.5 mPa b. 0.6 mPa
    c. 0.20 mPa * d. none

91. The rate of production is increased in the hot press method by
    a. applying heat to the mould surface *
    b. applying water to the mould surface
    c. applying air to the mould surface
    d. none of these

92. To achieve the highest out put the mould is heated in hot press method at
    a. 150°C b. 140°C *
    c. 170°C d. 200°C

93. Which of the following are continuous process
    a. continuous combination
    b. pultrusion
    c. tube rolling
    d. braiding
    e all of the above *

94. High performance polymer composition have their application in the areas
    a. aerospace b. sporting goods
    c. both a. & b. * d. none

95. Due to the excellent corrosion resistance of composites these are used in
    a. aerospace
    b. sporting goods
    c. marine application & chemical industries *
    d. none

96. Bicycle frames are made by which of composites
    a. carbon fibre * b. glass fibre
    c. both a. & b. d. none

97. Which process is one normally used for making bicycle frames
    a. braiding * b. pultrusion
    c. tube rolling d. none

98. Resin injection is limited to random reinforcement & _______________ fibre content
    a. high b. greater
    c. weaker d. low *

99. Vaccum assisted resin injection process overcome the following limitation
    a. produces large moulding
    b. produces moulding with higher fibre contents
    c. provides freedom to use high strength reinforcements
    d. all of the above *

100. Better consolidation and lower void contents are possible in
    a. resin injection *
    b. injection moulding
    c. cold press
    d. centrifugal casting

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CHAPTER - 83
CORE MATERIALS

1. Core material is
   a. used for face sheets
   b. a centeral member of assembly *
   c. the component of matrix
   d. none of the above

2. Core materials are used in
   a. molded constructions
   b. laminated constructions
   c. sandwitch constructions *
   d. none of the above

3. The core material gives a great deal of
   a. tensile strength
   b. compressive strength *
   c. both above
   d. none of the above

4. By using central foam to manufacture a composit rotor blade the solid core
   a. resists bending
   b. resists flexing
   c. greatly increases the life of skin
   d. provides all above *

5. The core material in use are
   a. foam b. honeycomb
   c. wood d. all above *

6. Mark the incorrect statement
   a. honey comb has greatest strength to weight ratio
   b. if a foam core is damaged, it returns to about 80% originality
   c. most honeycomb cores have little resiliency
   d. honeycomb has poor strength to weight ratio *

7. The ribbon direction of honeycomb core
   a. can be found by tearing
   b. is the tearing direction of core
   c. is taken into account for repair
   d. are considered as above *

8. Honey comb can be joined togather with
   a. polyester resin b. foam adhesive *
   c. thermoplastic matrix d. any of the above

9. Honey combs are joined togather with foam adhesive by
   a. laying the foam adhesive in between the parts
   b. heating to cure
   c. both above operations in sequence *
   d. by filling the core with liquid adhesive

10. Foam adhesive is prefered to join the honey comb core because of
    a. it has excellant adhesive quality
    b. it transfers stresses to core rapidly
    c. during curing foam expands into the crevices of core *
    d. none of the above

11. Different types of foams may be used as core material to meet the specific requirements, i.e.
    a. fire resistant
    b. repair and structural foams
    c. cushion foam
    d. a and b *

12. When foam is used for repair it is important that
    a. foam is of correct type
    b. foam is of correct density
    c. both above are considered *
    d. foam is from branded catagory

13. If a foam is sandwitched between two laminated layers of fiberglass on its each side becomes stiffer then laminate by
    a. ten times b. twenty times
    c. thirty times d. 37 times *

14. When two laminated fiberglass layers sandwitches a foam on its top and bottom side, the strength of the composit increases by
    a. 20 times with 8% extra weight
    b. 10 times with 6% extra weight *
    c. 15 times with 10% extra weight
    d. 10 times with 10% extra weight

15. Styrofoam should be used with
    a. polyester resin b. epoxy resin *
    c. metal matrix d. fiber glass

16. Styrofoam is used with epoxy resin, because
    a. polyester resin will dissolve the foam *
    b. epoxy resin will absolve the foam
    c. metal matrix will burn the foam
    d. of all above reasons

17. Styrofoam can be cut with
    a. a normal lenife b. scissors
    c. hot wire cutter * d. any of the above

18. When using hot wire cutter to cut the styrofoam in desired shape, then
    a. design is traced on foam before hand
    b. tamplate of desired shape is used *
    c. foam is cut to near size and design carved
    d. any above method may be adopted

19. Urethane foam can be used with
    a. polyester resin
    b. epoxy resin
    c. metal matrix
    d. both a & b *

20. Urethane foam can not be cut with hot wire cutter, because
    a. a hazardous gas is created when foam is heated *
    b. it totally get ignited with heat
    c. of both above reasons
    d. the foam melts with application of heat

21. Core materials are which part of an assembly
    a. upper member of an assembly
    b. lower member of an assembly
    c. centre member of an assembly *
    d. none of the above

22. How the core materials are used
    a. coated on surface plates
    b. sandwiched between two face sheets *
    c. both statements are correct
    d. none of the above are correct

23. Core Materials provide
    a. rigid lightweight component *
    b. rigid heavyweight component
    c. flexible component
    d. both a and b are correct

24. When core materials are bonded between two thin sheets, composite structure manufactured in this manner are termed as
    a. sandwiched construction *
    b. coated structure
    c. coarse construction
    d. none of the above

25. The core material gives the structure
    a. high compressive strength *
    b. low compressive strength
    c. medium compressive strength
    d. high tensile strength

26. In these materials identify the core material
    a. honey comb
    b. plastic
    c. iron
    d. both a and c are correct *

27. Why the foams are used in composite blades
    a. to absorb shocks or vibrations *
    b. to give aesthetic design
    c. to provide compressive strength
    d. both a and c are correct

28. A composite blade with a central foam or honeycomb eliminates
    a. flexing of the skin *
    b. corrosion
    c. both a and b are correct
    d. both a and b are wrong

29. How the core is stiff throughout the blade
    a. uniformly *
    b. ununiformly
    c. core has no stiffness
    d. none of the above

30. Skins will twist the following areas
    a. where there is a hinge support
    b. where there is a support
    c. where there is a stress concentration
    d. where there is no support *

31. Solid cores resist
    a. cracks of skin
    b. deformation of skin
    c. bending and flexing of the skin *
    d. all of the above

32. By using solid cores we can increase
    a. life of the skin *
    b. corrosion of skin
    c. cracks of skin
    d. none of the above

33. Two popular core structures are
    a. foam and honeycomb *
    b. horiteh structure
    c. both a and b
    d. none of the above

34. Core materials may also come in
    a. wood *
    b. wax
    c. plastic
    d. none of the above

35. Strength to weight ratio of honeycomb is
    a. greatest *
    b. lower
    c. medium
    d. none of the above

36. If a foam core is damaged it has a memory and will return to about
    a. 18% of its original strength
    b. 80% of its original strength *
    c. 60% of its original strength
    d. 40% of its original strength

37. Most honeycomb cores have
    a. no resiliency
    b. medium resiliency
    c. little resiliency *
    d. more resiliency

38. Metal skins will bend and flex when forces
    a. are applied on the flight *
    b. are not applied on the flight
    c. in both a and b cases
    d. no bend will occur at any case

39. Honeycombs are used in
    a. sandwiched construction
    b. I beam construction
    c. in both a and b construction *
    d. none of the above

40. Honeycombs may constructed of
   a. aluminium, kevlar(R), carbon, nomex etc. *
   b. aluminium, led, copper, iron etc.
   c. iron, magnesium, magnese etc.
   d. none of the above

41. Which one material is used in construction of honeycomb
   a. iron b. steel *
   c. magnesium d. copper

42. Honeycomb contains
   a. fibreglass and paper
   b. aluminium and kevlar
   c. carbon and steel
   d. all of the above *

43. Nomex is a trade name of
   a. dupont * b.ku pont
   c. neither a nor b d. paper

44. Nomex is widely used as
   a. matrix material
   b. advanced composite core material *
   c. both a and b
   d. none of the above

45. Nomex is a
   a. iron impregnated material
   b. paper impregnated material *
   c. copper impregnated material
   d. none of the above

46. Honeycombs core are made by
   a. coating the core materials
   b. crimping the core materials *
   c. pouring the molten material
   d. none of the above

47. The ribbon direction can be found by
   a. tearing along both side of honeycomb
   b. tearing along one side of honeycomb *
   c. both a and b statements are correct
   d. none of the above is correct

48. What should be the direction of tear to the direction of the ribbon
   a. perpendicular b. 30^0 inclination
   c. parallel * d. 45^0 inclination

49. Honeycomb can be jointed together
   a. with a iron plate b. with a loan adhesive *
   c. with a steel plate d. all of above

50. What is laid between the parts to be joined and heated to cure
   a. wood cores b. strux
   c. bond adhesive d. foam adhesive *

51. What should be the precaution during using foam ?
   a. type of foam should be proper
   b. density should be proper
   c. type of foam and density should be proper *
   d. none of the above

52. Styrofoam, urethane, polyvenyl chloride or strux are used in foam cores
   a. for laminar construction
   b. for sandwitch construction *
   c. both a and b
   d. none of the above

53. Foam construction can provide
   a. much greater strength and stiffness over plain laminates
   b. less strength over plain laminates
   c. high hardness over plain laminates
   d. both a and c statements are right *

54. Styroform is commonly used
   a. air buses b. home built aircrafts *
   c. commercial aircrafts d. none of the above

55. How many times the sandwitch structure is stiffer than the laminate (when 6% weight is increased)
   a. 41 b. 37 *
   c. 42. d. 49

56. How many times a sandwitch structure is stronger than a laminate when 6% change in weight is entertained
   a. 40 b. 10 *
   c. 20 d. 30

57. Styroform should be used with a
   a. epoxy resin only * b. carpoxy resin only
   c. polyester resin only d. none of the above

58. Which resin will dissolve in the styroform
   a. polyamide b. epoxy
   c. carpoxy d. polyster *

59. The styroform in cups have a large cell configuration and can not be used
   a. lattically b. plastically
   c. structurally * d. none of the above

60. The type of styroform which is used in aircraft is much
   a. plastic b. stronger *
   c. weaker d. none of the above

61. Styroform can be cut with a
   a. chiesel b. cold wire cutter
   c. hot wire cutter * d. hammer

62. A hot wire cutter is used in
   a. light weight aircrafts
   b. commercial aircrafts
   c. home built aircrafts *
   d. none of the above

63. Which kind of surfaces can be fabricated with the hot wire cutter
    a. rough surface
    b. smooth curved surfaces *
    c. plane surfaces
    d. both a and b statements are right

64. Urethane foam can be used with
    a. epoxy resin
    b. polyster resin
    c. either epoxy or polyster resin *
    d. none of the above

65. Urethane can not be cut with a
    a. simple tools b. hot wired cutter *
    c. knives d. both a and b

66. Polyvenyl chloride foam is used
    a. polyster resin
    b. epoxy resin
    c. either epoxy or polyster resin *
    d. none of the above

67. Polyvenyl chloride can be cut with a
    a. simple common tools
    b. knives
    c. a hot wire cutter *
    d. all of above

68. Strux is also known as
    a. cellular b. cellulose acetate
    c. both a and b * d. none of the above

69. Strux Foam material is used
    a. to built up ribs or other structural support *
    b. to built BUE (built up edges)
    c. both a and b
    d. none of the above

70. Wood cores are used for
    a. simple construction
    b. composite construction *
    c. in both a and b
    d. none of the above

71. Balsa wood or laminations are made up of
    a. soft wood b. hard wood *
    c. light wood d. wet wood

■■■

CHAPTER - 84
SANDWICH CONSTRUCTIONS

1. Sandwich construction consists of
   a. Two elements　b. Three elements *
   c. Four elements　d. Five elements

2. Each component of the sandwich construction itself is relatively
   a. Weak　b. Flexible
   c. Strong　d. Both (a) and (b) *

3. When components of sandwich construction are combined, they produce a structure that is
   a. Stiff　b. Strong
   c. Light weight　d. All *

4. Sandwich construction facings carry
   a. Axial loads　b. Bending loads
   c. Tensile loads　d. All above loads *

5. Core of sandwich construction carries
   a. Axial loads　b. Bending loads
   c. Tensile loads　d. Shear loads *

6. Sandwich construction is used in
   a. Commercial airplanes
   b. Helicopters
   c. Military space vehicles
   d. All above *

7. Application of sandwich materials in aircraft industry includes
   a. Use in aircraft wings
   b. Helicopter rotor blades
   c. Fire walls
   d. All *

8. Advantages of sandwich construction includes
   a. Smooth exterior
   b. High load carrying capacity
   c. Designing points
   d. (a) & (b) *

9. Disadvantages of sandwich construction is
   a. Designing cutouts *
   b. Low load carrying capacity
   c. Not thermal insulator
   d. Not efficient for compression loads

10. Advantages of sandwiched materials are, its
    a. Increased fatigue resistance
    b. Action as acoustic insulator
    c. Absence of potential leaks
    d. All above *

11. If the loads are very high and thick skins are required, we use
    a. A sheet and stringer　b. Extruded shape
    c. Both (a) and (b) *　d. None.

12. Facings carry
    a. Axial compressive loads
    b. Tensile loads
    c. Bending loads
    d. All above loads *

13. Bonding system depends upon the
    a. Structural requirement
    b. Environment requirement
    c. Both (a) and (b) *
    `d. None.

14. Selection of the facing material is dependent on the
    (i) Strength
    (ii) Stiffness
    (iii) Tolerance
    (iv) Environmental conditions
    a. Only (i)
    b. Both (i) & (ii)
    c. Both (ii) and (iii)
    d. All (i), (ii), (iii) and (iv) *

15. Primary function of core material is to provide
    a. Axial compressive strength
    b. Tensile strength
    c. Bending strength
    d. Shear strength*

16. Core should be
    a. Rigid *　b. Soft
    c. Ductile　d. None

17. Function of the core is to
    a. Maintain the distance between the outer faces
    b. To increase bending rigidity of the sandwich skin
    c. Both (a) and (b) *
    d. None

18. Cores are available in
    a. Wood　b. Foam
    c. Honey comb　d. All *

19. Cores are available in
    a. Steel　b. Sand
    c. Corrugation *　d. All

20. Which of the following core materials have better strength and shear modules
    a. Wood　b. Foam
    c. Honey comb *　d. Corrugation

21. Foam has ------------- shear strength than honey comb
    a. Lower * b. Higher
    c. Equal d. None

22. Honey comb has ---------------- modulus than foam
    a. Lower b. Higher *
    c. Equal d. No such relation

23. Which one of the following is the oldest form of core material
    a. Wood * b. Foam
    c. Honey comb d. Steel

24. The choice of foam is affected by the performance of core material in terms of
    a. Fire resistance b. High heat application
    c. Structural application d. All *

25. Densities for composite structures range from
    a. 1 - 20 kg / m^3 b. 40 - 200 kg / m^3 *
    c. 300 - 400 kg / m^3 d. 500 - 700 kg / m^3

26. PVC foams have
    a. Good resistance to water absorption *
    b. Poor resistance to water absorption
    c. Low resistance to water absorption
    d. None

27. The operating temperature range of PVC is
    a. -240^{0}C to +80^{0}C * b. -300^{0}C to -200^{0}C
    c. -240^{0}C to +240^{0}C d. None

28. PVC exists in
    a. Only one form
    b. Two different forms *
    c. Three different forms
    d. Four different forms

29. The linear PVC has
    a. High ductility
    b. Good material properties
    c. Both (a) and (b) *
    d. None

30. PVC foam is available in densities ranging from
    a. 1 to 30 kg / m^3 b. 30 to 400 kg / m^3 *
    c. 400 to 500 kg / m^3 d. 500 to 600 kg / m^3

31. Polystylene foams are available in densities ranging from
    a. 1 to 15 kg / m^3
    b. 15 to 100 kg / m^3
    c. 15 to 300 kg / m^3 *
    d. 300 to 400 kg / m^3

32. Polyurethane foams have
    a. Densities between 30 to 500 kg / m^3
    b. Good acoustic absorption
    c. Both (a) and (b) *
    d. None

33. Polymethyl methacrylamide foams are available in densities ranging from
    a. 1 to 30 kg / m^3 b. 30 to 300 kg / m^3 *
    c. 300 to 400 kg / m^3 d. 400 to 500 kg / m^3

34. Types of honey comb are
    a. Paper b. Aluminium
    c. Aramid papers d. All *

35. Aluminium honey comb includes
    a. Two alloys b. Three alloys
    c. Four alloys * d. Five alloys

36. Glass fibre reinforced plastic honey comb is most commonly used in
    a. Electrical sensitive parts
    b. Heat resistance resin
    c. Low thermal conductivity
    d. All *

37. Glass fibre plastic honey comb cell sizes is / are
    a. 5 mm b. 6.3 mm
    c. 10 mm d. All *

38. Aramid paper honey comb is
    a. Produced by Dupont *
    b. Produced by glass fibre
    c. Produced by Al-Alloys
    d. Produced by steel

39. Kevlar honey comb is usually available in cell sizes of
    a. 1 to 2 mm b. 2 to 4 mm
    c. 5.3 to 7.8 mm d. 6.3 to 9.5 mm *

40. Kevlar paper honey comb strength is above
    a. Strength of glass b. Strength of Nomex
    c. Both (a) & (b) * d. None

41. Shear strength of the core material
    a. Increases with increase in density *
    b. Decreases with increase in density
    c. Increases with decrease in density
    d. None

42. Compressive strength of core material
    a. Decreases with decrease in density *
    b. Increases with decrease in density
    c. Decreases with increase in density
    d. None

43. At room temperature Nomex honey comb has
    a. Compression strength 100 PSI *
    b. Compression modulus 6 PSI
    c. L shear modulus 10 PSI
    d. None

44. Phenolic honey comb at room temperature has
    a. Density 9.0 PCF
    b. Compression strength 2100 PSI
    c. Both (a) and (b) *
    d. None

45. Which of the following is/are aluminium honey comb
    a. 5052 Aluminium b. 5056 Aluminium
    c. 3003 Aluminium d. All *

46. How many ways are there for making honey comb
    a. One b. Two
    c. Three d. None *

47. Honey comb is manufactured by
    a. Adhesive bonding b. Resistance welding
    c. Brazing d. All *

48. Honey comb is manufactured by
    (i). Adhesive bonding (ii). Resistance welding
    (iii) Brazing (iv) Diffusion bonding
    (v) Thermal fusion
    a. Both (i) & (iv) b. (i), (ii) and (iii)
    c. (iv) & (v) d. (i), (ii), (iii), (iv), (v) *

49. The maximum temperature adhesive bonded material can withstand is about
    a. 399^0C * b. 499^0C
    c. 599^0C d. 699^0C

50. How many basic techniques are there, to convert the sheet steel into honey comb
    a. One b. Two *
    c. Three d. Four

51. The process used to make the sheet material into honey comb is
    a. Expansion process * b. Compression process
    c. Both d. None

52. The basic cell shapes are
    a. hexagon b. Square
    c. flex -core d. All *

53. Most resistance welded or brazed core have
    a. Square cells * b. Hexagonal
    c. Flex - core d. All

54. Important properties to determine the type of adhesive to be used
    a. Tensile modulus
    b. Shear modulus
    c. Co-efficient of thermal Expansion
    d. All *

55. The ways by which an adhesive is loaded are
    a. Tension
    b. Tension & Sheer
    c. Tension, Sheer and Peel
    d. Tension, Sheer, Peel and Cleavage *

56. In designing sandwich structures, the following aspects must be considered
    a. The sandwich is a composite structure
    b. The material used maybe anisotropic
    c. The core has sufficient shear modulus
    d. All *

57. The usual objective of a sandwich design is to
    a. Save weight
    b. Increase stiffness
    c. less use of skin material
    d. All *

58. Facing failure is caused by
    a. Insufficient panel thickness
    b. Insufficient facing thickness
    c. Insufficient facing strength
    d. All *

59. Local crushing of core is caused by
    a. Low core compression strength *
    b. Insufficient core rigidity
    c. Both (a) and (b)
    d. None

60. Transverse shear failure is caused in sandwich structure by
    a. Insufficient core strength *
    b. Low core compression strength
    c. Low core shear modulus
    d. None

61. The method of cutting used in honey comb process depends upon
    a. Density of honey comb
    b. Slice thickness of honey comb
    c. Type of honey comb
    d. All *

62. During cutting, to avoid collapsing of core we use
    a. Polyethylene glycol * b. Polyethene glycol
    c. Methyl glycol d. Ethyle glycol

63. Polyethelene glycol
    a. Is a wax like substance
    b. Has low melting point
    c. Has high melting point
    d. Both (a) and (b) *

64. Non-metallic honey comb
    a. Can be perforated
    b. Cannot be perforated *
    c. both a. and b.
    d. None

65. After cleaning, the core should be dried in an oven at
    a. 66^0C Maximum temp. *
    b. 86^0C Maximum temp.
    c. 106^0C Maximum temp.
    d. 126^0C Maximum temp.

66. Fabrication of honey comb sandwich composite panel is accomplished in
    a. Two different methods
    b. Three different methods *
    c. Four different methods
    d. Five different methods

67. A precured skin has good properties because it it cured at a pressure of
 a. 690 KPa * b. 790 KPa
 c. 890 KPa d. 990 KPa

68. One step cure process in fabrication of honey comb is known as
 a. 132^0C cure process * b. 152^0C cure process
 c. 172^0C cure process d. 192^0C cure process

69. Doublers
 a. Should be thicker than the facing
 b. Should not be thicker than the facing *
 c. Should be equal to the facing
 d. None

70. Inserts are put - in honey comb panels to take care of
 a. Heavy concentrated load *
 b. Heavy distributed load
 c. Light concentrated load
 d. None

71. Selection of fasteners for sandwich panels depend on
 a. Panel thickness
 b. Loading
 c. Environmental exposure
 d. All *

72. The molded - in type is always used because
 a. It provides best structural strength *
 b. It adds less weight
 c. It takes less time
 d. None

73. In fasteners the two primary loads that must be considered are
 a. Shear b. Tensile
 c. Both (a) and (b) * d. None

74. The basic concept of energy absorption is to take a moving object's kinetic energy and convert it into
 a. External work b. Internal work *
 c. Potential work d. None

75. The W cell count is determined by measuring the distance in the W direction of
 a. 5 cells b. 10 cells *
 c. 15 cells c. 20 cells

76. Under - expanding the core
 a. Increases the L shear properties
 b. Decreases the W shear properties
 c. Both (a) and (b) *
 d. None

77. Over - expanding the core
 a. Increases the W shear properties *
 b. Decreases the W shear properties
 c. Increases the L shear properties
 d. All

78. Compression tests on honey comb is / are
 a. Bare compression method *
 b. Unstabilised compression method
 c. Covered compression method
 d. None

79. Plate shear test can be done in by
 a. Two ways * b. Three ways
 c. Four ways d. Five ways

80. In plate shear test, the specimen length should be
 a. Equal to 12 times the core thickness *
 b. Equal to 18 times the core thickness
 c. Equal to 20 times the core thickness
 d. Equal to 25 times the core thickness

81. In 60 sec vertical burn test, applying flame temperature is
 a. 443^0C b. 843^0C *
 c. 1243^0C d. 1643^0C

82. Salt spray test is done to determine
 a. Core weight loss due to corrosion *
 b. Core strength loss due to corrosion
 c. Core hardness loss due to corrosion
 d. None

83. For flat - wise tension test
 a. Thickness is critical
 b. Thickness is not critical *
 c. Area is critical
 d. Area is not critical

84. The failure modes in flat - wise tension tests are
 a. Core tearing b. Adhesion - to - core
 c. Both (a) and (b) * d. None

85. The failure modes in the climbing drum peel test are
 a. Core tearing
 b. Adhesion to the facing
 c. Adhesion to the honey comb
 d. All *

86. Sandwich column usually fails by
 a. Face wrinkling b. Face dimpling
 c. Shear crimping d. All *

87. In beam flexure test, the span with a single point loading is
 a. 157 mm b. 257 mm
 c. 357 mm d. 457 mm *

88. In beam flexure test, the span with a single point loading is
 a. 208 mm b. 308 mm
 c. 408 mm d. 508 mm *

89. In beam flexure test, the beams are normally ---------- wider than the span
 a. 36.2 mm b. 46.2 mm
 c. 66.2 mm d. 76.2 mm *

90. In beam flexure test, the beams are normally ---------- longer than the span
    a. 1 inch
    b. 2 inch
    c. 3 inch
    d. 4 inch *

91. Relative strength of honey comb sandwich in percentage is
    a. 100 *
    b. 200
    c. 300
    d. 400

92. Relative stiffness in percentage of plywood is
    a. 5
    b. 10
    c. 15
    d. 17 *

93. 5052 - H39 aluminium alloy is
    a. Strongest of the regular aircraft grade *
    b. Weakest of the regular aircraft grade
    c. No corrosion resistance
    d. None.

94. 5052 - H39 aluminium alloy is
    a. Most commonly used aircraft grade *
    b. Rarely used aircraft grade
    c. No corrosion resistance
    d. All

95. General buckling caused in a sandwich structure is caused by
    a. Insufficient panel thickness
    b. Insufficient core rigidity
    c. Both (a) and (c) *
    d. None

96. Intracell buckling is called
    a. Dimpling *
    b. Crimping
    c. Shear
    d. Transverse

97. MIL-C-7438 perforations shall be of such a size and location that all cells are vented at least every --------- in thickness dimension
    a. 6.3 mm *
    b. 8.3 mm
    c. 10.3 mm
    d. 12.3 mm

98. A few precautions are to be observed during sandwich construction are
    a. The elevated temperature
    b. A route should be provided for the escape of trapped air
    c. Most adhesives flow at an early point in the cure cycle
    d. All above *

99. Design consideration, that go into choosing, which type of sandwich is used
    a. Overall panel thickness
    b. Core type
    c. Facing thickness
    d. All above *

100. Aluminium honey comb core is mainly used in
    a. Energy absorption application *
    b. For high tensile strength
    c. Both (a) and (b)
    d. None

■■■

CHAPTER - 85
NON-DESTRUCTIVE INSPECTIONS

1. Tap testing is used to detect
   a. dis bonds * b. impact damage
   c. cracks d. hole damage

2. Optical inspection is used to detect
   a. impact damage b. cracks
   c. hole damage d. All above defects *

3. Tap testing is used to detect
   a. delamination * b. void
   c. inclusions d. All

4. Visual inspection is used to detect
   a. impact damage * b. dis bonds
   c. delamination d. All

5. Bond tester is used to detect
   a. dis bonds * b. cracks
   c. hole d. None

6. Penetrant test is used to detect
   a. cracks b. edge delaminations
   c. both (a) & (b) * d. None

7. Resonator is used to detect
   a. delamination * b. cracks
   c. hole d. All above

8. Thermography test is used to detect
   a. impact damage b. delamination
   c. dis bonds d. All above flaws *

9. Holography is used to detect
   a. impact damage b. delamination
   c. dis bonds d. All above *

10. Acoustic emission is used to detect
    a. cracks * b. hole damage
    c. lightning strike d. All above

11. Laser shearography is used to detect
    a. dis bonds * b. corrosion
    c. lightning strike d. All above

12. Which one of the following is non distructive test
    a. Vicker pyramid test b. Brinell hardness test
    c. Penetrant test * d. All above

13. Ultrasonic testing is used to detect
    a. delamination b. dis bonds
    c. cracks d. All above *

14. Ultrasonic test is used to detect
    a. for defect evaluation * b. hole damage
    c. lightning strike d. All above

15. Radiography test is used to detect
    a. delamination b. dis bonds
    c. cracks d. All above *

16. Microwave testing is used to detect
    a. matrix porosity * b. cracks
    c. hole damage d. All above

17. Microwave testing is used to detect
    a. dis bonds b. delamination
    c. lightning strike d. None *

18. Most commonly used method for non distructive test is
    a. ultrasonic b. radiography
    c. both (a) & (b) * d. None

19. Which of the following is detected by visual inspection
    a. punctures b. gouges
    c. heat damage d. All above *

20. Bond tester works on the principle of
    a. ultra sonic resonance *
    b. ultravoilet resonance
    c. hypercritical resonance
    d. All above

21. In penetrant testing we use
    a. fluid * b. light
    c. solid d. None

22. In penetrant testing ,fluids have
    a. low viscosity * b. high viscosity
    c. high surface tension d. None

23. Penetrant testing is effective for the
    a. Defects which are open to the surface *
    b. Defects which do not open to the surface
    c. Both (a) & (b)
    d. None

24. All bodies above the temperature of absolute zero emit
    a. ultravoilet radiation
    b. sonic radiation
    c. electromagnetic radiation *
    d. All above

25. Intensity of radiation
    a. depends on the nature of the surface *
    b. does not depends on the nature of surface
    c. Both (a) & (b)
    d. None

26. Thermography is used for fibre glass thickness upto
    a. 3 mm b. 3 cm *
    c. 3 m d. 4 m.

27. The use of infrared required only a rise in the temperature of the part under test is
    a. 5 - 10°C
    b. 10 - 20°C *
    c. 30 - 40°C
    d. 50 - 60°C.

28. Disadvantages of thermography is/are
    a. requirement of a very high heat source
    b. requirement of a uniform heat source *
    c. to detect the flaws located at free surface
    d. all.

29. Acoustic emission testing involves the detection of
    a. elastic energy *
    b. kinetic energy
    c. potential energy
    d. stored energy.

30. Acoustic emission testing is used for detection of
    a. moisture in honey comb
    b. corrosion in honey comb
    c. cracks
    d. all above*

31. The primary acoustic emission source in composites is to check
    a. fibre fracture
    b. matrix crack
    c. fibre debonding
    d. all above *

32. Eddy current testing is based on the principle of
    a. electric induction b. magnetic induction *
    d. solar induction d. none.

33. Ultra sonic inspection makes use of frequency
    a. above 20 KHz * b. above 20 Hz
    c. above 40 Hz d. below 20 KHz.

34. In ultrasonic process, geometric attenuation is due to
    a. delaminations b. porosity
    c. matrix cracks d. all above *

35. In the pulse-echo mode the number of transducer is
    a. one * b. two
    c. three d. four.

36. In through - transmission mode, the number of transducers used is
    a. one b. two *
    c. three d. four.

37. The ultrasonic results is presented in
    a. one way b. two ways
    c. three ways * d. four ways.

38. In oscilloscope X-axis corresponds to
    a. time *
    b. defect
    c. volume
    d. the amplitude of signals.

39. In oscilloscope Y - axis corresponds to
    a. amplitude of the signal reflected from the top surface
    b. amplitude of the signal reflected from the back surface
    c. defect
    d. all above *

40. In ultrasonic result, A - scan primarily gives
    a. depth of the defect *
    b. width of the defect
    c. diameter of defect
    d. all above.

41. Ultrasonic C- scan has been used extensively to determine
    a. void content
    b. progression of damage
    c. initial integrity of a manufactured part
    d. all above *

42. Ultrasonic resonance inspection method is
    a. one sided method *
    b. two side method
    c. multi sided method
    d. three sided method.

43. X-rays can be used to detect
    a. porosity
    b. matrix cracks
    c. some foreign materials
    d. all above *

44. In tomographic inspection
    a. variation of less than 0.1% detectable *
    b. variation of less than 1% detectable
    c. variation of less than 10% detectable
    d. variation of less than 20% detectable.

45. In neutron radiography
    a. protective shielding is used *
    b. flux is used
    c. wax is used
    d. none.

46. Which technique is used for porosity flaw
    a. thermal IR
    b. shearography
    c. neutron radiography *
    d. all.

47. Which NDE method is used for foreign material
    a. UT pulse echo * b. Neutron radiography
    c. shearography d. X-ray back scatter.

48. Which method is used for deep delamination
 a. UT pulse echo
 b. UT correlator
 c. computed tomography
 d. all *

49. Which NDI method is used for fibre breaks flaws
 a. eddy current and microwave *
 b. x-ray
 c. acousto ultrasonic
 d. all.

50. Which NDI method is used for condensed core flaw ?
 a. x-ray and computed tomography *
 b. neutron radiography
 c. thermal IR
 d. all.

51. Which NDI method is used for water intrusion flow
 a. X- ray
 b. neutron radiography *
 c. computed tomography
 d. all.

52. For corroded core, the NDI used is
 a. neutron radiography *
 b. X-ray
 c. computed tomography
 d. all.

53. For foam adhesive voids, the NDI used is
 a. X-ray
 b. neutron radiography
 c. computed tomography *
 d. all.

54. Which NDI is used for crushed core flaw ?
 a. UT through transmission
 b. UT correlator
 c. X- ray
 d. all above *

55. For fatigued core which type of NDI is used
 a. x-ray *
 b. computed tomography
 c. thermal IR
 d. all.

56. Which type of NDI method is used for bondline adhesive voids flaw ?
 a. UT through transmission
 b. UT resonance
 c. UT correlator
 d. all *

57. Which type of NDI method is used for skin disbond flaw ?
 a. UT through transmission *
 b. Computed tomography
 c. both (a) and (b)
 d. all.

58. Neutron radiography NDI method is used for
 a. water intrusion b. corroded core
 c. porosity d. all above *

59. UT pulse echo is used for
 a. porosity b. foreign material
 c. shallow delamination d. all above *

60. Computed tomography NDI method is used for
 a. condensed core * b. crushed core
 c. fibre breaks d. all.

61. The development and selection of non destructive evaluation technique applied for
 a. composite material and structure *
 b. metallic material and structure
 c. both are correct
 d. none of the above

62. The performance of a composite depend upon
 a. layered, anisotropic material, inhomogeneities
 b. layered isotropic material, homogenetic *
 c. both a & b
 d. depend upon only the homogenetic

63. Concentration of constitutes means
 a. fibre - resin ratio * b. resin - starvation ratio
 c. both a & b d. all the above

64. Inhomogeneities of material affect the performance of composite include
 a. concentration of constitutes.... solids...
 b. matrix reinforcement bonding and similar characteristics
 c. both a & b *
 d. none of the above

65. The defect of the material appears due to
 a. moisture, ultra violet ray, cracks
 b. impact damage, fire or excessive heat
 c. both a & b *
 d. none of the above

66. The purpose of NDE is to
 a. detect the defects only *
 b. detect and correct the defect only
 c. some times detect and some times it correct the defect
 d. none of the above

67. While the service records of the material is excellent, they are subjective to damage by
 a. moisture, ultra violet, cracks heat etc.
 b. overloads, heat lighting, low velocity impact *
 c. impact damage, fire or excessive heat
 d. moisture intrusion, ultra violet, excess heat

68. Non destructive inspection helps
 a. to determine the size of the defect in a component*
 b. to determine the correction of the size of the defect.
 c. it reduce the size of the defect.
 d. none of the above.

69. The procedure for non-destructive evaluation of composite is used for
    a. detection of the presence of flaws and measurement of the extent of damage. *
    b. it correct the presence of flaws and reduce the extent of damage.
    c. some times it detect the presence of flaws and measurement of the extent of damage.
    d. both b & c are correct.

70. Tap testing is used for
    a. to detect the disbonds-delaminations. *
    b. to detect impact damage, cracks-hole.
    c. to detect delamination disbonds.
    d. to detect impact damage disbonds delaminations.

71. Visual or optical inspection used
    a. to detect disbonds, delamination
    b. to detect impact damage, cracks hole damage, lighting strike, burns / overheating. *
    c. to detect matrix porosity
    d. all are correct.

72. Bond tester is used to
    a. detect matrix porosity.
    b. detect cracks, delaminations.
    c. detect delamination, disbonds. *
    d. none of the above are correct.

73. Resonator means
    a. bonds tester * b. top tester
    c. microwave testing d. ultrasonic

74. Lenefront means
    a. to detect matrix porosity
    b. to detect delamination
    c. to detect delamination, cracks *
    d. to detect disbonds

75. Thermography is used
    a. to detect impact damage, cracks, hole, damage.
    b. to detect impact damage, delamination, disbonds*
    c. to detect cracks, delamination.
    d. none of the above

76. Laser shearography is used
    a. to detect impact damage, delamination, disbonds*
    b. to detect matrix porosity
    c. to detect delamination, disbonds, cracks voids inclusions
    d. all the above are correct

77. Holography means
    a. lesser shearography * b. radio graphy
    c. microwave testing d. none of the above

78. Acoustic Emission used to
    a. detect cracks, delaminations *
    b. detect matrix porosity
    c. detect delaminations and disbonds
    d. detect delamination, disbonds and cracks

79. Ultrasonic process used to
    a. detect disbonds and cracks
    b. detect delamination , disbonds, cracks, voids, inclusions and also for defect evaluation. *
    c. defect disbonds , cracks and voids
    d. all are correct.

80. Radiography process used to
    a. detect delamination, disbonds, cracks, hole, damage, corrosion, lighting strike and also for detect evaluation. *
    b. detect only cracks and delaminations
    c. detect delamination and disbonds
    d. detect matrix porosity

81. Microwave testing used to
    a. detect impact, damage, cracks.
    b. detect matrix porosity *
    c. detect impact damage, cracks, holes, burns.
    d. none of the above.

82. Matrix porosity can be detected by the process of
    a. tap testing
    b. visual and optical inspection
    c. microwave testing *
    d. thermology

83. To detect disbonds and delaminations we used the technique
    a. tap-testing * b. ultrasonic
    c. penetrant d. all are correct

84. To detect the cracks and delamination we use the
    a. microwave testing b. acoustic emission *
    c. resonator d. all are correct

85. To detect impact damage, delamination and disbonds we used the
    a. thermology * b. penetrant
    c. tap testing d. microwave testing

86. To detect delamination, disbonds, cracks, voids, inclusion we used
    a. ultrasonic * b. radiography
    c. microwave testing d. tap-testing

87. To detect delamination, disbonds, cracks, hole damage, corrosion, lighting strike we use the technique
    a. ultrasonic
    b. radiography *
    c. microwave testing
    d. all are correct

88. To detect impact damage, cracks, hole damage, lighting strike, burns/overheating we used
    a. visual or optical inspection *
    b. tap testing
    c. acoustic emission
    d. none of the above

89. By the Holography we can do the following job
    a. to detect the impact damage, delamination disbonds. *
    b. to detect matrix porosity
    c. to detect disbonds and delamination
    d. none of the above.

90. Which method is used for quick evaluation of Aircraft surface to detect presence of disbonds
    a. microwave testing b. tap testing *
    b. penetrant d. ultrasonic

91. The typical walk around inspection of A/C is commonly known as
    a. visual or optical inspection *
    b. tap testing
    c. penetrant
    d. ultrasonic

92. If an A/C the damage cause due to low velocity impact, this can be detect by
    a. simply by typical walk around inspect of A/C
    b. not enough to only inspect it is important that other tools must be used to assess the extent of damage *
    c. both a & b are correct
    d. all are in correct

93. Variable frequency instrument are used in the
    a. penetrant technique
    b. bondtester technique *
    c. thermography
    d. visual or optical inspection

94. The technique which consists of applying a fluid with low viscosity and surface tension to the surface of a part is known as
    a. penetrant technique * b. thermology
    c. tap testing d. microwave testing

95. Penetrant Inspection is recommended to be performed in an
    a. enclosed area without air circulation *
    b. enclosed area with air circulation
    c. open area with air circulation
    d. none of the above

96. For Aerospace laminates of gaphic / epovy as well as for marine applications of fibre glass upto about 3 cm thick. Which technique we use ?
    a. ultrasonic b. penetrant technique
    c. thermology * d. radiography

97. Which method is used to detect the elastic energy that is spontaneously released by materials when the undergo deformation
    a. holography
    b. ultrasonic
    c. microwave testing
    d. acoustic emission testing *

98. Which method depend upon the principle of magnetic Induction to check the material under test
    a. acoustic ultrasonic b. ultrasonic
    c. eddy current testing * d. none of the above

99. Ultrasonic Inspection makes use
    a. of high frequency (above 20 KHz) *
    b. of low frequency (below 20 KHz)
    c. frequency between 20 Hz £F£,20 KHz
    d. there is no limit of frequency

100. Which technique we use for quality control and flaw detection in composites laminates
    a. ultrasonic * b. current testing
    c. accosting ultrasonic d. all are correct

101. The ultra sound in ultrasonic technique is generally transmitted and received by
    a. ultrasonic tranducer only
    b. ultrasonic tranducer in a pulse - echo or a through transmission line *
    c. through transmission line only
    d. all are correct

102. When the ultrasound in ultrasonic technique is transmitted by a tranducer and the reflected signal is received by the same tranducer the mode is known as
    a. through transmission mode
    b. pulse-echo mode *
    c. transmission and pulse echo mode
    d. all are incorrect

103. How many ways of presenting the ultrasonic result ?
    a. there are four ways (A B C D)
    b. there are five ways (A B C D E)
    c. there are two ways (A & B)
    d. there are three ways (A -, B-, C- & echo) *

104. When the defect are displayed on the y axis of an CRO while X axis corresponds to time known as
    a. A-scan * b. B-scan
    c. A- and B-scan d. C-scan

105. When scanning involves mechanical or electrical scanning by the tranducer it is known as
    a. D - scan b. B - scan
    c. A - scan d. C - scan *

106. Which method detect laminar discontinued within composite or bonded structure by setting up a continuous ultrasonic wave
    a. ultrasonic correlation
    b. ultrasonic polar back seater approach
    c. ultrasonic resonance inspection method *
    d. none of the above.

107. Which is the unique approach to the ultrasonic Inspection of highly alternative materials
    a. Ultrasonic resonance inspection method
    b. Ultrasonic polar back scatter approach
    c. Ultrasonic correlation *
    d. All are correct.

108. In x-ray radiology. Which type of material used to enhance the sensitivity
    a. low density composite material *
    b. high density composite material
    c. medium density composite material
    d. all are correct

109. Which method is used for examining of composite material is carried out with low energy detectable x-ray to ensure that detects are detectable
    a. conventional x-ray radiography *
    b. x-ray backseater imaging
    c. computed tomography
    d. neutron radiography

110. When technique depend upon the attenuation of beam of penetrating radiation to form the image of a part
    a. conventional x-ray radiography
    b. x-ray back scatter image *
    c. computed Tomology
    d. neutron radiography

111. In which technique the differential absorption of neutrons rather than of electromagnetic radiation
    a. x-ray back scatter image
    b. neutron radiology *
    c. computed tomology
    d. none of the above

112. Which method is very sensitive to small changes in the dielectric properties of low conductivity component
    a. microwave testing *
    b. neutron radiography
    c. computed tomography
    d. none of the above

■■■

CHAPTER - 86
DESIGN ASPECTS

1. Typical components whose failure would seriously endanger the aircraft safety is /are
   a. Wing & tail unit
   b. Wing & main flaps
   c. Tail unit & main flaps
   d. Wing, tail unit and main flaps *

2. Composites exhibit
   a. Ductile material characteristics
   b. Brittle material characteristics *
   c. Elastic material characteristics
   d. None

3. The ultimate strength of composite materials is based on failure of
   a. Fibre b. Resin
   c. Adhesive d. Both (a) & (b) *

4. Actual strength of composite materials depends on
   a. Piles b. Ply orientation
   c. Fibre material d. All *

5. Monolithic structures have
   a. Core material b. No core material
   c. Solid laminates d. Both (b) and (c) *

6. Solid laminates are of
   a. Only one shape b. Two shapes
   c. Three shapes d. Various shapes *

7. The advantages of solid laminates is/are
   a. Reduced weight
   b. Improved resistance to fatigue
   c. Improved resistance to corrosion damage
   d. All *

8. The lamina has the strength properties in the
   a. Longitudinal direction * b. Normal direction
   c. Angular direction d. All

9. Lamina is considered to be transversely isotropic in the
   a. Transverse planes b. Shear planes
   c. Both a. and b. * d. None

10. The actual stresses in a laminated structure can be determined taking into account the stiffness values in
    a. One direction b. Two direction
    c. Longitudinal direction d. Different directions *

11. Higher void content means
    a. Lower fatigue resistance
    b. Greater susceptibility to water penetration
    c. Both (a) and (b) *
    d. None.

12. A good composite material should have voids
    a. Less than 1% * b. Less than 2%
    c. Less than 5% d. Less than 10%

13. Weight of fibres is given by
    a. $w_f = \rho_f v_f / \rho_c$ * b. $w_f = \dfrac{\rho_f v_m}{\rho_c}$
    c. $w_f = \dfrac{\rho_m v_f}{\rho_f}$ d. None

    where f, m, c, stand for fibre, matrix material, composite material.

14. Volume of matrix material is given by
    a. $v_m = \dfrac{\rho_c w_m}{\rho_m}$ * b. $v_m = \dfrac{\rho_c w_m}{\rho_c}$
    c. $v_m = \dfrac{\rho_c w_c}{\rho_c}$ d. None

15. Void content is indicated in terms of volume fraction is given by
    a. $v_v = (\rho_{ct} - \rho_{ce}) / \rho_{ct}$ *
    b. $v_v = (\rho_u - \rho_{ct}) / \rho_{ct}$
    c. $v_v = (\rho_{ce} - \rho_{ct}) / \rho_{ce}$
    d. None

    where ρ_{ct} - theoritical density of composite
    ρ_{ce} -experimental determined density of composite

16. In a composite the total stress is
    a. $6_c = 6_f V_f + 6_m V_m$ *
    b. $6_c = 6_f V_m + 6_m V_c$
    c. $6_c = 6_f / V_f + 6_m / V_m$.
    d. None

17. Longitudinal modules of elasticity is given as
    a. $E_{11} = E_f / V_f + E_m / V_m$
    b. $E_{11} = E_f V_f + E_m V_m$ *
    c. $E_{11} = \dfrac{V_f}{E_f} + \dfrac{V_m}{E_m}$
    d. None

18. The in-plane shear modulus of lamina G_{12} is determined by assuming that the
    a. Shear stresses in the fibre is equal to the shear stress in the matrix *
    b. Shear stresses in the fibre is twice to the shear stress in the matrix
    c. Shear stresses in the fibre is thrice to the shear stress in the matrix
    d. None

19. For a three dimensional composite lamina, there are
    a. Three independent elastic constant
    b. Five independent elastic constant
    c. Seven independent elastic constant
    d. Nine independent elastic constant *

20. For a two dimensional composite lamina, there are
    a. Two independent elastic constant
    b. Three independent elastic constant
    c. Four independent elastic constant *
    d. Five independent elastic constant

21. In advanced composite materials, the fibres usually
    a. have higher modulus than the matrix
    b. have lower modules than the matrix
    c. carry most of the load
    d. Both (a) and (b) *

22. For uniform loads in fibre direction
    a. the strains in the fibre and the matrix are equal *
    b. the strain in the fibre is twice that of matrix
    c. the strain in the matrix is twice that of fibre
    d. the strain in the matrix is twice that of fibre.

23. In composite materials, the main applied loads are carried by the
    a. fibres * b. bond
    c. matrix d. bond and matrix.

24. The strength and stiffness are
    a. much greater along the direction of fibres *
    b. much greater along the transverse direction of fibres
    c. greater in transverse direction and greater along the direction of fibres respectively
    d. none.

25. As the fibre-matrix interface strength is increased
    a. transverse tensile strength increase
    b. in-plane shear strength increase
    c. inter laminar shear strength increase
    d. all *

26. For compressive loads applied parallel to the fibres of a unidirectional composite, we must consider
    a. strength b. stability
    c. both * d. none.

27. For matrix dominated failure, there are how many types of shear stresses
    a. one b. two *
    c. three d. four.

28. The assumption of laminate theory are
    a. the thickness of the plate is much smaller as compared to the in-plane dimensions *
    b. the strain in the deformed plate are bigger as compared to units
    c. stress normal to the plate is considerable
    d. All.

29. The assumptions of laminate plate theory are
    a. vertical deflection doesn't vary through out the thickness
    b. stress normal to the plate surface is negligible
    c. vertical deflection does not vary through out the thickness
    d. All *

30. Conclusion of laminate plate theory is/are that
    a. transverse shear strains are negligible *
    b. transverse shear strains are considerable
    c. normal strains are considerable
    d. normal strains and transverse shear strains are considerable.

31. The total strain in the laminate can be expressed as
    a. $\{\varepsilon\} = \{\varepsilon^\circ\} + Z\{K\}$ * b. $\{\varepsilon^\circ\} = \{\varepsilon\} + Z\{K\}$
    c. $\{\varepsilon\} = Z\{\varepsilon\} + \{K\}$ d. none.
    Where,
    ε° = mid plane strain K = mid-plane curvature
    Z = Distance of an arbitrary point from the geometric mid-plane

32. On the Z - coordinate,
    a. mid plane strains are dependent
    b. mid plane strains are not dependent *
    c. mid plane curvature are dependent
    d. (a) and (b)

33. Total strain in the laminate varies
    a. Linearly through the thickness of the laminate *
    b. Parabolic through the thickness of the laminate
    c. Logarithmic through the thickness of the laminate
    d. None.

34. Various plies in a laminate have
    a. one fibre orientation
    b. two fibre orientations
    c. one and half fibre orientations
    d. different fibre orientations *

35. An isotropic material is characterized by at least
    a. two strength parameters *
    b. three strength parameters
    c. four strength parameters
    d. five strength parameters.

36. For orthotropic materials, the basic strength measurements must include minimum of
    a. two parameters b. three parameters
    c. four parameters d. five parameters *

37. When ever in composite material, the strength/stress ratio becomes one, then
    a. the ply is at the critical point of failure *
    b. the ply is at the yield point of failure
    c. the ply cannot support the applied load
    d. none .

38. The least ply failure represents the
    a. yield strength of a laminate
    b. elastic strength of a laminate
    c. ultimate strength of a laminate *
    d. none.

39. How many aspects of damage tolerance safety are there ?
    a. two b. three *
    c. four d. five.

40. In damage tolerance criteria, the diameter of impact is
    a. 1.54 cm b. 2.54 cm *
    c. 3.54 cm d. 4.54 cm

41. The shape of the impact in damage tolerance criteria is
    a. cone b. hemispherical *
    c. spherical d. cylinderical.

42. The diameter of impact in durability criteria is
    a. 1.3 cm * b. 2.3 cm
    c. 3.3 cm d. 4.3 cm.

43. The design process for advanced composites involves
    a. Laminate design
    b. Component design
    c. Manufacturing process
    d. All *

44. The data required to support preliminary design include
    a. stiffness b. density
    c. strengths d. all *

45. Important parameters, which are considered while substantiating the static strength of a composite design
    a. critical load cases
    b. associated failure modes
    c. desired repair scenarios
    d. all *

46. Key properties involved in lamina testing are
    a. Lamina tensile strengths and modulli
    b. lamina shear strengths and modulli
    c. Interlaminar fracture toughness
    d. all above *

47. There are how many basic approaches to full scale testing for certification
    a. two *
    b. three
    c. four
    d. five.

48. Typical full-scale tests comprise
    a. static test
    b. durability test
    c. damage tolerance test
    d. all above *

49. Data application for full scale test, can be grouped into
    a. two categories b. three categories
    c. four categories d. five categories *

50. A basis value is an estimate of a given
    a. percentile value of a material property *
    b. non percentile value of a material property
    c. percentile value of a material structure
    d. none.

■■■

CHAPTER - 87
MANUFACTURING

1. Which of following is not an advantage of tape
   a. high fibre volume achievable
   b. low scrape rate
   c. no discontinuities
   d. lower impact resistance *

2. Poor drape on complex shapes is
   a. advantage of tape
   b. disadvantage of tape *
   c. disadvantage of fabric
   d. advantage of fabric

3. Which of the following is not a disadvantage of fabric
   a. fibre discontinuities (splices)
   b. lower fibre volume than type
   c. balanced and symmetric single ply *
   d. all of the above

4. Indifferent warp and fill properties is
   a. an advantage of tape
   b. an advantage of fabric
   c. a disadvantage of fabric *
   d. a disadvantage of tape

5. Orientation accuracy in manual is
   a. least accurate *
   b. automatic
   c. somewhat dependent on tape accuracy and computer programme
   d. none of the above

6. Ply count is operator dependent in
   a. manual b. flate tape
   c. both a & b * d. contoured tape

7. Release film retention is automatic in
   a. manual
   b. flat tape
   c. contoured tape & Flat tape *
   d. manual contoured tape

8. Cutting waste in least scrap in
   a. manual tape b. flat tape
   c. contoured tape * d. none

9. Compaction pressure is least voids in
   a. manual b. flat
   c. contoured * d. all of these

10. Manual and flat tape are not applicable for which at following consideration
   a. compaction pressure b. cutting waste
   c. programming * d. tape length

11. Low scrap rate is
   a. advantage of fabric b. advantage of tape *
   c. disadvantage of fabric d. disadvantage of tape

12. Multiple plies requirement is
   a. advantage of fabric b. disadvantage of tape *
   c. advantage of tape d. disadvantage of fabric

13. Non discontinuities is
   a. advantage of tape * b. advantage of fabric
   c. all of the above d. none of the above

14. As compailed to tape, fabric has
   a. higher fibre volume b. lower fibre volume *
   c. neither a nor b d. both a and b

15. Which of following is not an advantage of fabric
   a. symmetric and balanced ply
   b. better impact resistance
   c. low scrap rate *
   d. all of the above

16. Fabric is less strength and modules
   a. true * b. false

17. Which of following is not a disadvantage of fabric
   a. lest strength and module
   b. lower fibre volume
   c. lower impact resistance *
   d. more costly

18. Which is not advantage of tape
   a. low scrap rate
   b. no discontinuities
   c. lower impact resistance *
   d. less tendency to trap volatiles

19. Part warping due to fabric distation is
   a. advantage of tape
   b. advantage of fabric
   c. disadvantage of fabric *
   d. disadvantage of tape

20. Multiple format available in
   a. tape b. fabric *
   c. both a and b d. none

21. Which of the following is not an open mold process
   a. complession molding *
   b. filament winding
   c. sheet molding compound
   d. injection molding

22. Expansion tool molding is
    a. open mold process *
    b. close mold process
    c. continuous process
    d. none of above

23. Pultrusion and braiding belongs to
    a. open mold process b. closed mold process
    c. continuous process * d. all of the above

24. Vacuum bag, pressure bag, autoclape undergo
    a. open mold process b. closed mold *
    c. both a & b d. none

25. Which of the following not advantage of open mold process
    a. low to medium number of parts
    b. long cycle time per molding
    c. long mold and / or tooling cost *
    d. operator skill dependent

26. Long cycle times per molding is
    a. disadvantage of close molding *
    b. disadvantage of close mold process
    c. both a and b
    d. none of these

27. Low cost way of quickly depositing fibre and resin is
    a. advantage of open mold process *
    b. advantage of closed mold process
    c. both a and b
    d. none of these

28. Spray lay up is belongs to
    a. open mold process * b. closed mold process
    c. continuous process d. none of these

29. Which of following is not application of spray mold
    a. truck fairings
    b. caravan bodies
    c. standard wind turbine blades *
    d. shower tray

30. The need of low viscosity resins is
    a. advantage of spray lay up
    b. advantage of wet lay up
    c. disadvantage of wet lay up
    d. disadvantage of spray lay up *

31. Which of this is correct
    a. wet lay up result higher fibre content than spray lay up
    b. wet lay up result longer fibre than spray lay up
    c. all above *
    d. none

32. Which is not a disadvantage of wet lay up
    a. low volume process
    b. low viscosity resin need to be workable by hand
    c. longer cure time
    d. none of these *

33. Which of the following is disadvantage of filament winding
    a. resins need to be low in viscosity to be sprayable
    b. resins need to be low in viscosity to be workable by hand
    c. low viscosity resins usually needed to be used with lower mechanical properties *
    d. none of the above

34. Which of the following has advantage of high volume production
    a. contact moulding b. filament winding
    c. sheet moulding * d. spray lay up

35. Simplicity and low cost is the major advantage of
    a. wet lay up / hand lay up
    b. spray lay up
    c. filament winding
    d. contact moulding *

36. Which of follow do not under go closed moulding
    a. pultrasion *
    b. compression molding
    c. vacuum bag molding
    d. expendable vaccum bagging

37. Which of the following is not an advantage of vaccum bagging method
    a. higher fibre content laminates usually are achieved
    b. operative skills determines mixing and control of resin content *
    c. amount of volatiles emitted by vaccum bag
    d. lower void content

38. Which of the following is not an advantage of vaccum bagging
    a. extra process adds cost in labour and in disponsable bagging material
    b. needs higher operating skill
    c. poor external finish *
    d. mixing and control of resin content still largely determined by operator skill

39. Which of the following is not an advantage of prepreg molding
    a. continuous production *
    b. minimised fibre cost in unidirectional tap
    c. accurately set resin / catalyst level and the resin content in the fibre
    d. optimised resin chemistry for mechanical and thermal performance

40. Much lower tooling cost due to half of the tool being vaccum bag, is advantage of
    a. resin film infusion b. pultrusion
    c. VARTM * d. RTM

41. Faster Production Cycle is advantage of
    a. VARTM * b. RTM
    c. Pultrusion d. none of the above

42. Excellent part reproducibility is advantage of
    a. sheet molding compound *
    b. expansion tool molding
    c. both a and b
    d. none of these

43. Which of the following is false for Resin Film Infusion (RFI)
    a. High fibre volume can be accurately achieved with low void content.
    b. High resin mechanical properties due to solid state of initial polymer material and elevented temperature cure.
    c. Core materials needs to withstand the process temperatures and pressures.
    d. Cored structures can be produced in one operation *

44. Which of following process is limited convex shaped component
    a. expansion tool molding
    b. filament winding *
    c. sheet molding compound
    d. contact molding

45. Which of the following is not function of bag sealant
    a. temporarily bonds vaccum bag to tool. *
    b. allows air or vaccum transfer to all of part.
    c. imparts desired contour and surface finish to compositor.
    d. imparts a bondable surface to cured laminate.

46. Which of the following not advantage of fabric
    a. better drape for complex shaper.
    b. better impact resistance.
    c. plies stay in line better during cure.
    d. best modules and strength efficiently. *

47. Freedom of design and easy to change design are advantage of
    a. closed mold process
    b. open mold process *
    c. continuous mold process
    d. none of these

48. Which of following open mold process provide excellent design flexibility
    a. spray lay up
    b. sheet molding compound *
    c. wet lay up
    d. expansion tool molding

49. Which of following is having low volatile emission among following closed mold process
    a. resin transfer molding *
    b. vaccum assisted resin testing molding
    c. resin film infusion
    d. injection molding

50. Low tooling cost is possible with
    a. closed mold process
    b. open mold process *
    c. continuous mold process
    d. all the above

51. Choice the correct statement for Resin Film Infusion (RFI)
    a. high fibre volumes can be accurately achieved with low void contents *
    b. low fibre volumes can be accurately achieved with high void contents.
    c. low fibre volumes can be accurately with less void contents.
    d. high fibre volumes can be accurately with high void contents.

52. Manufacturing of composite materials depends upon
    a. available technology
    b. existing facilities
    c. personnel skill
    d. all above *

53. The goals of the composite manufacturing process are
    a. achieve a consistent product
    b. minimize voids
    c. process in the least costly manner
    d. all above*

54. Tape advantage is/are
    a. best modulus and strength efficiency *
    b. good drape on complex shapes
    c. higher impact resistance
    d. lower labour cost for hand lay up.

55. Tape advantages is/are
    a. low scrap rate
    b. no discontinuities
    c. automated lay up possible
    d. all *

56. Disadvantages of tape is/are
    a. lower impact resistance *
    b. high scrap rate
    c. discontinuities
    d. low fibre volume achievable.

57. Disadvantage of tape is/are
    a. poor drape on complex shapes
    b. lower impact resistance
    c. cured composite is more difficult to machine
    d. all above *

58. Fabric advantages is/are
    a. better drape for complex shapes *
    b. high strength and modulus
    c. low cost than tape
    d. all.

59. Fabric advantage is/are
    a. can be laid up without resin
    b. cured part is easier to machine
    c. many forms available
    d. all above *

60. Disadvantages of fabric is/are
   a. fibre discontinuities
   b. less strength
   c. less modulus
   d. all above *

61. Disadvantages of fabric is/are
   a. lower fibre volume than tape
   b. more costly than tape
   c. greater scrap rates
   d. all above *

62. Orientation accuracy lay-up technique manual is
   a. least accurate *
   b. dependent on operator
   c. longer tape more difficult.
   d. none of these

63. Most widely used manufacturing method for laminated fibre composites is/are
   a. open mold process
   b. closed mold process *
   c. continuous process.
   d. none

64. Spray lay-up method is
   a. open mold method *
   b. closed mold method
   c. continuous process
   d. all.

65. Which of the following is/are open mold processes
   a. filament winding *
   b. compression molding
   c. injection molding
   d. pultrusion.

66. Which of the following is cold mold process
   a. contact molding
   b. filament winding
   c. injection molding *
   d. pultrusion.

67. Which of the following is continuous process
   a. braiding
   b. pultrusion
   c. injection molding
   d. both (a) and (b) *

68. Advantages of the open mold process is/are
   a. freedom of design *
   b. short cycle times per molding
   c. no operator skill dependent
   d. all.

69. Advantages of the open mold process is/are
   a. easy to change design
   b. low mold cost
   c. low tooling cost
   d. all above *

70. Disadvantage of open mold processes is/are
   a. long cycle time per molding *
   b. no freedom of design
   c. difficult to change design
   d. all.

71. Disadvantages of open mold process is/are
   a. low to medium number of parts
   b. long cycle time per molding
   c. operator skill dependent
   d. all above *

72. Advantage of spray lap-up is
   a. widely used for many years *
   b. light in weight
   c. less harmful
   d. all.

73. Advantages of spray lay-up is/are
   a. low cost tooling
   b. widely used for many years
   c. low cost way of quickly depositing fibre and resin
   d. all above *

74. Application of spray - lay -up is done in
   a. simple enclosures *
   b. heavy loaded
   c. complex enclosures
   d. none.

75. The oldest and most commonly used methods for manufacturing of composites parts is
   a. wet lay up *
   b. spray lay-up
   c. filament windings
   d. contact molding

76. In wet lay-up, resins are in the form of
   a. woven b. knitted
   c. stitched d. all above *

77. Which of the following is an advantage of hand lay-up
   a. design flexibility * b. high volume process
   c. low cure time d. all.

78. Advantages of hand lay-up is/are
   a. complex items can be produced
   b. tooling cost is low
   c. design changes are easily effected
   d. all above *

79. Which of the following is advantage of wet lay-up
   a. tooling cost is low *
   b. the waste factor can be low
   c. high volume process
   d. short cure time required.

80. Disadvantages of wet lay-up is/are
   a. only one molded surface is obtained
   b. low volume process
   c. longer cure times required
   d. all above *

81. Applications of wet lay-up is/are
    a. standard wind-turbine blades *
    b. caravan bodies
    c. truck fairings
    d. shower trays

82. Filament winding is
    a. automated process *
    b. oldest method
    c. hand -held gun
    d. all.

83. How many basic types of filament winding are there
    a. two * b. three
    c. four d. five.

84. The basic type of filament winding is
    a. polar method * b. linear method
    c. square method d. all.

85. In high helical pattern winding
    a. the mandrel rotates *
    b. the mandrel transverses back and forth
    c. the shuttle rotates
    d. the mandrel is stationary

86. In high helical pattern winding
    a. the mandrel rotates
    b. the shuttle transverses back and forth
    c. mandrel rotation in the horizontal plane
    d. all above *

87. In high helical pattern winding the angles of the mandrel rotation axis is
    a. 10° - 15° b. 15° - 20°
    c. 25° - 50° d. 25° - 85° *

88. Removable mandrels are classified as
    (i) entirely removed (ii) collapsible
    (iii) breakable (iv) soluble
    a. only (i) b. (i) and (iii)
    c. (ii) and (iii) d. (i), (ii), (iii) and (iv) *

89. Low melting temperature alloys for mandrel is used for
    a. small diameter application *
    b. irregular shape
    c. when the mandrel remains a part of the structure
    d. all.

90. Advantages of filament winding is/are
    a. excellent mechanical properties
    b. high degree of design flexibility
    c. economic method of laying down material
    d. all above *

91. Which one of the following is advantage of filament winding
    a. this is a very fast *
    b. easy to wind complex shapes
    c. good external finish
    d. all.

92. Disadvantages of filament winding is/are
    a. poor external finish *
    b. poor mechanical properties
    c. low degree of design flexibility
    d. all.

93. Disadvantages of filament winding is/are
    a. limited to convex shaped component
    b. poor external finish
    c. both (a) and (b) *
    d. none.

94. Advantage of sheet moulding compound is
    a. high volume production *
    b. poor part reproductivity
    c. excellent density flexibility
    d. both (a) and (c)

95. Disadvantages of sheet molding compound is
    a. low volume production
    b. maximum material scrap
    c. poor design flexibility
    d. none *

96. The female areas of the mold are made of a material with a
    a. low co-efficient of thermal expansion *
    b. high co-efficient of thermal expansion
    c. high co-efficient of pressure expansion
    d. none.

97. The male plug in expansion tool molding is made of
    a. silicon rubber * b. iron
    c. copper d. all.

98. The pressure and temperature used in expansion hot molding are
    a. 14 MPa and 175°C * b. 4 MPa and 175°C
    c. 14 MPa and 300°C d. all.

99. The linear thermal co-efficient of the most silicon rubbers fall in the range of
    a. $1 - 2.1 \times 10^{-5}$ * b. $4 - 4.1 \times 10^{-5}$
    c. $8 - 8.1 \times 10^{-5}$ d. $10 - 10.1 \times 10^{-5}$.

100. The linear expansion of rubber is approximately
    a. 5 times that of carbon steel
    b. 10 times that of carbon
    c. 17 times that of carbon steel *
    d. 50 times that of carbon steel.

101. Contact molding method is
    a. simple b. low cost
    c. slow d. all above *

102. In compression molding we get
    a. better physical properties than injection molding*
    b. poor physical properties than injection molding
    c. poor mechanical properties than injection molding
    d. all.

103. In compression molding, the curing time is between
a. 5 sec to 50 sec b. 25 sec to 180 sec *
c. 100 sec to 240 sec d. 300 sec to 400 sec.

104. The molding pressure in compression molding is
a. 0.7 to 9 MPa
b. 100 to 200 PSI
c. 0.7 N/mm^2 to 9 N/mm^2
d. all above *

105. Compression molding is suitable for
a. low volume production
b. high volume production *
c. limited variety of shpes
d. limited variety of sizes.

106. Requirement for proper bagging is/are
a. to be impervious to air pressure
b. to apply the uniform cure pressure
c. not to leak under over pressure
d. all above. *

107. Function of bagging film is to
a. allow for vacuum and pressure *
b. exhaust the air
c. holds other component of bag in place
d. allows flow of resin

108. Fucnction of polyester tape (wide) is to
a. allow air or vacuum transfer to all of part
b. holds other components of bag in place *
c. improve surface finish
d. all.

109. The function of peel ply is to
a. temporarily bond vacuum bag to tool
b. allow transfer of air or vacuum
c. imparts a bondable surface to cured laminate *
d. soak up excess resin.

110. The function of Glass bleeder ply is/are
a. soaks up excess resin *
b. allows flow of resin
c. exhaust air
d. holds component in place.

111. The function of caul sheet is/are
a. imparts desired contour
b. surface finish to composites
c. both (a) and (b) *
d. none.

112. The function of stacked silicon edge dam is to
a. allow transfer of air
b. hold components in place
c. soak up excess resin
d. none *

113. How many types of vaccum bags are commonly used
a. two * b. three
c. four d. five.

114. Which methods is used to eliminate bridging of the vaccum bag
a. ears * b. eyes
c. nose d. hands.

115. Advantages of the vaccum bagging method is that
a. lower void contents are achieved than with wet lay up *
b. non skill labour is required
c. it is of low cost
d. none.

116. Disadvantage of the vaccum bagging method is
a. high cost *
b. high voids contents
c. low fibre content laminates
d. all.

117. The primary disadvntage of autoclave molding is/are
a. high initial cost b. high operation cost
c. both (a) and (b) * d. none.

118. In autoclave molding, curing is achieved under
a. pressure b. temperature
c. inert condition d. all above *

119. A separator in autoclave molding provides
a. cured part a smooth surface
b. volatiles to escape from the laminate *
c. air to escape from the laminate
d. all above

120. Epoxy matrix composites, in general, used in autoclave cure cycles, which involves
a. 487 - 690 KPa b. 175°C
c. 350°F d. all above *

121. The function of pressure vessel in autoclave is
a. to retain pressure inside the work space *
b. to maintain temperature inside the workspace
c. to control cure cycles
d. all.

122. Gas heating is regularly used in autoclaves with maximum operating temperature of
a. 450° - 540°C * b. 650° - 750°C
c. 850°C - 950°C d. 950° - 1050°C.

123. Steam heating used in autoclaves is operating between
a. 100 - 125°C b. 150° - 175°C *
c. 200° - 250°C d. 250° - 300°C.

124. Gas circulation in autoclave is maintained at
a. 1 to 3 m/sec * b. 10 to 13 m/sec
c. 20 to 23 m/sec d. 30 to 33 m/sec .

125. Gages used for autoclaves are
a. air and nitrogen
b. air, nitrogen, oxygen
c. air, nitrogen and carbondioxide *
d. carbondioxide and nitrogen.

126. Nitrogen is vaporised at
 a. 1380 to 1552 KPa * b. 1000 to 1100 KPa
 c. 800 to 952 KPa d. 780 to 952 KPa.

127. The advantage of resin transfer molding is
 a. large and complex shapes can be made efficiently*
 b. the mold design is simple
 c. control of flow pattern is simple
 d. all

128. The advantages of resin transfer molding is/are
 a. production cycle is faster than wet lay-up
 b. large and complex shape can be made efficiently
 c. volatile emissions are low
 d. all above *

129. Disadvantages of resin transfer molding is/are
 a. the mold design is critical *
 b. large shape cannot be produced easily
 c. high skill labour is required
 d. all.

130. Advantage of vacuum assisted resin transfer molding is that it is
 a. much lower tooling cost *
 b. poor expensive scrap parts
 c. both (a) and (b)
 d. none.

131. Advntages of VARTM is/are that
 a. it is of much lower tooling cost and large component can be fabricated
 b. it is cored structures can be produced in one operation
 c. it is standard wet lay-up tools may be modified for this process
 d. all above.*

132. Advantage of resin film infusion is that
 a. it is widely proven outside the aeroplane industry*
 b. it is high fibre volumes can be accurately achieved.
 c. both (a) and (b)
 d. none.

133. Pultrusion is used to manufacture
 a. I - beam b. box
 c. tubings d. all above.*

134. The pultrusion process machine consists of
 a. four different parts b. five different parts
 c. six different parts * d. seven different parts

135. Which one is the beginning of pultrusion process
 a. the resin bath b. the cred *
 c. the die d. none.

136. Vinyl ester resins are used for
 a. corrosion resistance *
 b. improved mechanical properties
 c. improved electrical properties
 d. all above.

137. Epoxy resin is used for
 a. corrosion resistance
 b. superior mechanical properties *
 c. superior chemical properties
 d. none of these

138. The chief advantage of pultrusion process is/are
 a. low cost
 b. short period
 c. produce consistent parts
 d. all above *

139. In braiding, the surface of the mandrel is tightly woven with the fibres in a
 a. helical patterns * b. circular patterns
 c. rectangular pattern d. all above.

140. The braiding carriers follow
 a a smooth path b. a zig - zag path *
 c. a straight line part d. none.

141. Prepregs are heated between
 a. 10° - 20°C b. 50° - 100°C
 c. 120° - 180°C * d. 200° - 250°C.

142. Disadvantage of prepreg molding is that
 a. material cost is high *
 b. labour cost is high
 c. fibre cost is maximised
 d. all above.

143. Composite assemblies are used to replace the metal counter parts to reduce the costs by approximatly
 a. 5% b. 10%
 c. 15% d. 20% *

144. The composite structure can be made in very complicated shapes and can be molded togather with
 a. stiffners b. ribs and lugs
 c. beams d. all above in one piece *

145. To augment the strength of the finished composite product while curing
 a. heat is applied
 b. pressure is applied
 c. both heat & pressure is applied *
 d. chilled below -50^0 C

146. The application of heat and pressure during curing period
 a. completly saturate the composite material
 b. squeeze out the excess resin
 c. eliminate the air pockets
 d. facilitates all above *

147. In compression molding method the resin and fiber are
 a. pumped into mould under pressure
 b. fabric is placed into mould and matrix is rammed in
 c. fabric is wetted with matrix and compressed between male and female mold *
 d. any of the above three methods may be adopted

148. The product is cured in compression molding by
a. keeping the product at room temperature
b. keeping the product at sub. zero temperature
c. heating the mold at specific temperature for definet time *
d. none of the above method

149. In compression molding, for curing the mold, is heated by
a. circulation of heated oil
b. impeded electric filament
c. placing into an oven
d. any of the above methods *

150. In compression molding methods, once mold is made
a. only small number of products are molded
b. moderate number of product are molded
c. it can turn out a very large number of precision products *
d. only one product per mold is produced

151. The vacumme begging method of applying pressure to cure composites is
a. the most commonly used method
b. to place the object in a plastic bag and the air is with drawn
c. by pressing the object in vacumme beg by atmospheric pressure
d. all as mentioned in a, b and c *

152. A good vacumme source for composites will pull about at sea level by
a. 20 inches Hg b. 28 inches Hg *
c. 35 inches Hg d. 10 inches Hg

153. Vaccumme bag technique can be used in combination with
a. molds b. wet lay up
c. autoclave d. all above *

154. Mark the correct statement
a. vacumme bagging applies uniform pressure
b. it is drawback that un-even pressure is applied by bagging
c. vacumme bagging is economical for large & complicated shapes
d. a and c are the correct statements *

155. Matrix is evenly distributed to fibers by
a. compression molding
b. vacumme bagging
c. both above methods *
d. none of the above methods

156. Vacumme bagging and compression molds are advantageous for
a. ellimination of air bubbles
b. resulting seamless structure
c. easy to fabricate stronger composites
d. all above *

157. Composite produced by filament winding are
a. relatively weaker
b. incredibly strong structure *
c. with poor strength/weight ratio
d. in rare use in aviation

158. Filament winding is done by
a. winding the contineous thread of re-inforcing fibers with resin
b. using a suitable designed mandrel to wind around
c. winding pre-preg fiber threads with machines or robots
d. by adopting all above *

159. To manufacture a composite by filament winding method
a. thread is diped in resin dry off extra resin, wound and cure *
b. wound the thread, dip in resin, dry extra resin and cure
c. use prepeg fiber, wound and cure
d. the curing is non essential

160. Filamenet winding is used in the fabrication of
a. helicopter rotor blades
b. propellars
c. even entire fuselage
d. all above *

161. Presently, filament wound parts
a. are repaired extensively with fabrics
b. have few approved repairs without cutting the filament *
c. are being repaired with chopped fibers
d. have not adapted above mentioned repairs *

162. Wet lay up manufacturing technique is less precise than
a. compression molding b. vaccumme bagging *
c. filament winding d. all above methods

163. Wet lay up is simple and easy method, as
a. fiber re-inforcement is mixed with matrix
b. the wet fabric is just layed over a surface
c. both above simple operations are performed *
d. fiber is layed on surface and matrix is applied over it

164. Mark the incorrect statement regarding wet lay up technique of manufacturing compositee
a. it is the most flexible procedure
b. it is favourite of home aircraft builders
c. this method is same as adopted for compositee repairs
d. all above statements are not correct *

165. For lightening protection complete aircraft is needed to be bonded property. For compositee parts, for conductivity
a. carbon/graphite is used
b. an aluminium strip is interposed in part *
c. no provisioning is required
d. a bonding wire is layed over the composite part

166. For fiber glass composites the bonding provided by
  a. weaving the aluminium wires into top layer of fabric *
  b. a fine aluminium screen is laminated below top layer
  c. a thin aluminium foil is bonded over the top layer
  d. any of the above method may be adopted

167. For conductivity of carbon/graphite parts
  a. a fine aluminium screen is sandwitched with glass fiber *
  b. a thin foil of aluminium bonded with top layer
  c. an aluminium strip is interposed during production
  d. any of the above method may be adopted

168. For carbon/graphite composites for bonding , aluminium screen is sandwitch between fiber glass layers, because
  a. of batter conductivity
  b. galvanic action may take place *
  c. of both above reasons
  d. the screen is a weaker structure

169. For lightning protection some manufacturers
  a. flame spray the aluminium onto the component
  b. just paint the component with aluminium point
  c. bonds a piece of metal to the composite in contact with metal part
  d. adopts one of the above methods *

170. After manufacturing, compositee part is painted to
  a. prevent from moistures
  b. provide a cosmetic appearance
  c. protect from lightning
  d. satisfy a and b *

171. Some companies use a layer of __________ before painting the composite for extra protection
  a. tedlar b. plastic
  c. rubber d. a & b as both are same *

172. Gel coat used during manufacturing of composite is a
  a. rubber resin b. polyester resin *
  c. epoxy resin d. none of the above

173. To provide get coat during manufacturing of composite
  a. the mold is coated with color polyester resin before molding *
  b. it is coated immediately after molding
  c. gel coat resin is mixed with bonding matrix
  d. any of the above method may be adopted

174. Gel coat provided on compositee part is
  a. a structural part b. non-structural part
  c. just like a paint coat d. both b & c are correct *

175. Gel coats were used extensively on gliders it has the drawbacks of
  a. lesser strength than epoxy resin
  b. inflexibility
  c. cracking under sun and weather
  d. all above *

176. In case of gel-coat cracking
  a. it can be re-juvenated like dope
  b. it cannot be applied like dopes
  c. the get coat is sanded off and re-applied *
  d. it cannot be re-coated

177. Presently composites are painted with new generation paints which are
  a. flexible
  b. wear resistant
  c. as said in a & b *
  d. inflexible but wear resistant

178. Composites which uses modern paints are
  a. directly painted after manufacturing
  b. primed and painted
  c. painted in the same manner as aluminium
  d. painted as said in b & c. *

■■■

CHAPTER - 88
TOOLING FOR COMPOSITES

1. Factor which govern the basic tool design is
   a. co-efficient of thermal expansion *
   b. co-efficient of pressure expansion
   c. co-efficient of Poisson's expansion
   d. all.

2. A master model is identified with
   a. holes   b. scribe lines
   c. trim line   d. all *

3. Master model is a
   a. physical representation of the design *
   b. chemical representation of the design
   c. biological representation of the design
   d. none.

4. Plaster master is made from
   a. $CaSO_4$ *   b. $CaSO_2$
   c. $CaCO_3$ d. $CaCO_4$.

5. Plaster has a setting expansion of approximately
   a. 0.080% *   b. 0.040%
   c. 0.020%   d. 0.010%.

6. Thermal expansion of plaster in the dried state is
   a. 0.011/°C   b. 0.027/°C *
   c. 0.27/°C   d. 2.7/°C.

7. Templates are usually made of
   a. Al *   b. Na
   c. S   d. K.

8. Tooling balls, indicate
   a. X-direction
   b. Y- direction
   c. X and Y directions
   d. X, Y and Z directions *

9. Each template is attached at ----------------angle to the base table with angle
   a. 45°   b. 90° *
   c. 120°   d. 150°.

10. Threaded rods are secured on each side of the templates to provide
    a. smoothness of face
    b. rigidity of face *
    c. ductility of face
    d. all above.

11. Which of the following is used to seal the plaster to avoid moisture content
    a. lacquer *   b. liquid
    c. sodium   d. all

12. Follow board method is used where
    a. a constant cross - section is required *
    b. a constant length is required
    c. a constant width is required
    d. all.

13. Sweep method is used for
    a. unsymmetrical surface
    b. symmetrical surface *
    c. constant cross-section surface
    d. none.

14. As a rule of thumb, debulking should be
    a. done after every 4-5 plies *
    b. done after every 5-10 plies
    c. done after every 10-15 plies
    d. done after every 15 - 20 plies.

15. Too much resin will result in
    a. cracking *   b. bending
    c. shearing   d. deflection.

16. Plastic faced plasters can be used in an autoclave upto approximately
    a. 105°C *   b. 205°C
    c. 305°   d. 405°C

17. Drill templates are used
    a. primarily to drill
    b. to locate precision holes
    c. both (a) and (b) *
    d. none.

18. Trim and router templates can be fabricated directly from the
    a. master model   b. composite tool
    c. tooling aids   d. all above *

■■■

CHAPTER - 89
LAMINATE LAY-UPS

1. The 0° ply orientation is used to carry the
   a. longitudinal loading * b. transverse loading
   d. shear loading d. all.

2. The 90° ply orientation is suited to the
   a. longitudinal loading b. transverse loading *
   c. shear loading d. all.

3. The ± 45°C ply orientation is for
   a. Longitudinal loading b. transverse loading
   c. shear loading * d. bending loading.

4. Symmetric laminates should be used in order to
   a. reduce out - of - plane strains
   b. reduce coupled bending and stretching of the laminate
   c. complexity of analysis
   d. all above *

5. 'T' outside the bracket in total - lay - up code denotes
   a. total laminate definition code *
   b. symmetrical laminate definition code
   c. number of times the set of plies within the bracket is repeated before reaching the laminate mid plane
   d. all.

6. A $[\pm 45]_s$ lay-up is an example of
   a. mid-plane symmetric laminates
   b. balanced laminates
   c. angle ply laminates *
   d. cross-ply laminates.

7. In a cross-ply laminate
   a. $A_{16} = A_{26} = B_{16} = B_{26} = 0$
   b. $A_{16} = A_{26} = 0$
   c. $D_{16} = D_{26} = 0$
   d. $A_{16} = A_{26} = B_{16} = B_{26} = D_{16} = D_{26} = 0$. *

8. For a quasi - isotropic laminate, the main design requirement is that
   a. it must have two layers
   b. it must have three layers
   c. it must have three layers or more *
   d. it must have one layer.

9. If the total number of layers is 'n', the angle between two adjacent layers should be
   a. $\frac{360}{4n}$ b. $\frac{360}{3n}$
   c. $\frac{360}{2n}$ d. $\frac{360}{n}$ *

10. In Antisymmetric laminates have an even number, i.e.
    a. $A_{16} = A_{26} = 0$
    b. $A_{16} = B_{26} = D_{26} = 0$
    c. $A_{16} = B_{26} = D_{16} = D_{26} = 0$ *
    d. $A_{16} = B_{36} = 0$.

11. In case of antisymmetric cross - Ply laminates, then it is
    a. $A_{16} = B_{26}$
    b. $A_{26} = B_{16}$
    c. $A_{16} = A_{26} = B_{16} = B_{26}$
    d. $A_{16} = A_{26} = B_{16} = B_{26} = D_{16} = D_{26} = 0$ *

12. Most laminates used today are
    a. Symmetric b. Unsymmetric
    c. with angle d. All as per a., b. & c.*

■■■

CHAPTER - 90
APPLYING PRESSURE

1. The purpose of mechanical pressure applied on composite, during curing is
   a. squeeze out excessive resin
   b. to remove trapped air between the layers
   c. compact the layers and maintain contours of repair
   d. to obtain all above *

2. Pressure is applied on composites, during curing by means of
   a. vacumm bagging
   b. shot bags, clecos or spring clamps
   c. hydraulic press
   d. as mentioned in a and b *

3. The most effective method of applying pressure to a composite repair is
   a. vacumm bagging *
   b. shot bags
   c. elecos and spring clamps
   d. all above

4. If composite is being worked upon under excess humidity, then most prefered method of applying pressure is
   a. vacumm bagging * b. shot bagging
   c. spring clamps d. hydraulic press

5. Vacumm bagging works by
   a. inflating the bag
   b. atmospheric pressure
   c. creating vacumm in bag
   d. both above mentioned in a & b *

6. The amount of pressure created during a vacumm bagging
   a. higher at higher elevations
   b. higher at lower elevations *
   c. lesser at sea level
   d. remains constant at all levels

7. The amount of pressure created during vacumm bagging depend upon
   a. effectiveness of seal
   b. amount of vacumm created
   c. attitude
   d. all above *

8. Vacumm bagging is mostly done on
   a. large surfaces
   b. repairs
   c. both above *
   d. none of the above

9. On puncture repairs
   a. vacumm bagging is done to seal the puncture one side
   b. repair is done turn by turn on both the sides
   c. repair is done both sides simultaneously
   d. are done as (b) by adopting (a) *

10. Self enclosed bagging material
   a. is a plastic tube which can be sealed at the ends
   b. used for large parts
   c. used for small parts
   d. is as said in a and c *

11. In case of a hollow part is cured with self enclosed bagging
   a. repair area may collapse
   b. then internal as well as external bagging is done
   c. the both above statements are true
   d. then only external bagging is done *

12. Parting film or parting fabric (peal ply) are used between vacumm bag and job
   a. to allow excess matrix to flow through upper surface
   b. to prevent sticking of other materials to the repair
   c. to feather into seam of fabric and smoothen it
   d. to obtain all above *

13. Rough surface is suitable for painting, hence instead of parting film ___________ is used as peel ply
   a. release fabric
   b. perforated release film
   c. either of above *
   d. none of the above

14. Mark the correct statement
   a. perforated release film is a plastic with small holes
   b. bleeder material is a absorbent material
   c. both above statements are correct *
   d. both above statements are wrong

15. Breather material is placed to one side of repair to
   a. allow excess matrix to flow through it
   b. allow air to flow through it and up through vacumm value *
   c. creat vacumm in bag
   d. absorb excess matrix

16. Bleeders and breathers
   a. material can be the same
   b. material can not be the same
   c. are inter changable
   d. are as said in a and c *

17. The sealant tape is used
    a. in conjuction with vacumm bagging film
    b. to produce air tight seal
    c. to facilitate its removal after repair without peeling of paint
    d. is as all above *

18. For composite repair mark the wrong statement
    a. thermo couple or temperature sensing device is placed next to repair
    b. heat blanket is used to cure the repair
    c. parting film is placed in between repair and heat blanket
    d. parting film, get melt and absorbed in composite material *

19. The most commonly used vacumm bagging film
    a. is made of nylon
    b. resists tear and puncture
    c. is rated at different temperatures
    d. is as all above *

20. The most effective way to creat a seal with the bagging material is
    a. by removing the paper from sealant-tape and lightly pressing the bag *
    b. by laying a tape over the edges of bagging material
    c. any of the above method may be adopted
    d. by creating the appropriate suction

21. Mark the correct statement
    a. a small x cut is made in film to accomodate vacumm value
    b. bagging film is slided part the threads on vacumm valve base
    c. a rubber grommet is used to seal the vacumm valve
    d. all above statements are correct *

22. Initially when vacumm source is switched on, usually leaks occur at
    a. tape overlaps b. pleats
    c. wire passages d. all above locations *

23. Vacumm leak may be checked by
    a. listening the hissing sound
    b. noting the drop in vacumm gauge *
    c. applying the soapy water
    d. none of the above

24. After curing process, the peel ply is removed
    a. alongwith layers of bleeders and breather
    b. along with bagging film, bleeder and breather
    c. just before the painting is done to keep surface clean *
    d. immediatly after bleeder is removed

25. In case a parting film is used instead of peel ply then
    a. surface is directly painted after film is removed
    b. surface must be scuff sanded *
    c. surface is roughened by the grinders
    d. either of b and c method may be adopted

26. Vacumm bagging film comes in a variety of temperature ranges from
    a. room temperature to 750^0 F *
    b. room temperature to 500^0 F
    c. 100^0 C to 500^0 F
    d. 150^0 C to 750^0 F

27. It is important to use correct temperature rating to cure, so that
    a. bagging film becomes hard at high temperature
    b. bagging film brittles at low temperatures
    c. bagging film remains flexible at high temperature *
    d. all above qualities are obtained

28. Bagging film is
    a. a hydro-philic
    b. water sensitive
    c. more flexible with more moisture
    d. as all above *

29. Bagging films are stored such that
    a. it is absolutely dry
    b. its moisture contents are maintained *
    c. it gets age hardened
    d. mentioned in a & c

30. In vacumm bagging process, sometime "bridging effect" may take place during curing due to
    a. none confirmation of shape by bagging film
    b. insufficient pleats around bagging area
    c. both above *
    d. incorrect curing temperature

31. Release fabrics and films are used when
    a. barrier is needed between wet surface and bagging material
    b. the resins are expected to flow up into bleeder
    c. both above needs occur *
    d. additional re-inforcement is required

32. Peel plies
    a. are a nylon or polyester release fabric
    b. are peeled off the part after curing
    c. are extremely helpfull over seams and fabric overlaps
    d. are all as mentioned above *

33. Peel plies causes off the rough surface of the composite repair which is
    a. useful for painting * b. to be smoothen out
    c. a draw back of peel ply d. of no consequence

34. Peel plies may have ___________ finishes
    a. very smooth
    b. a more coarse
    c. corrogated
    d. a very smooth or more coarse *

35. Some peel plies may be treated with
    a. mold release b. corona
    c. teflon coat d. any of the above *

36. Release film may be as
a. barrier film
b. perforated plastic film
c. peel ply
d. all above *

37. Non-perforated barrier film is used oftenly between
a. bleeder and breather
b. heat blanket and bagging film
c. heat blanket and bleeder *
d. heat blanket and bagging film

38. Bleeders are made of
a. felt
b. some absorbent material
c. blotting paper
d. a and b *

39. Mark the incorrect statement regarding bleeder material
a. bleeders are placed over the repair work without release film *
b. bleeders are interchangable with breathers
c. bleeders are never placed on repair without peel ply
d. bleeders are available in different thickness and weight

40. If a pre-preg fabric is used for repair, then bleeders used is
a. thicker
b. thinner *
c. of any thickness
d. thickest

41. In some instances a calking or pressure plate is used during composite repairs to
a. add extra pressure
b. smooth the contour of the part
c. insulate the heat
d. obtain as per a & b *

42. Calking plate is usually an optional piece made of
a. wood
b. aluminium
c. copper
d. any of the above *

43. Insulation plies are used to
a. to hold the heat in
b. minimise the heat loss
c. obtain both above *
d. insulate repair from heat blanket

44. Insulation plies are made of
a. few layers of fiber glass
b. a sewen blanket with many layer
c. non-conducting materials
d. a and b *

45. If repair is done at both the sides of edges calking plate should be used in the vacumm bag to
a. prevent bending of repair plies up or down *
b. provide additional pressure
c. smoothen the repair work
d. obtain all above

■■■

CHAPTER - 91
METHOD OF CURING

1. Composite matrix systems cure by
   a. chemically * b. electrically
   b. electromagnetically d. both a and b

2. Some of the matrix system cured by
   a. cold condition b. applying head *
   c. both a and b d. none of the above

3. Which of the following is affect during the curing process
   a. altitude b. pressure
   c. humidity * d. propulsive efficiency

4. Repair of composite material may be cured at
   a. 65^0 F b. $65 - 80^0$ C
   c. $65 - 80^0$ F * d. 65^0 C

5. The time span for repairing composite material is
   a. 6 - 8 hours b. 8 - 24 hours *
   c. 8 - 18 hours d. 10 - 24 hours

6. Full cure strength of the composite material is achieved by
   a. 2 - 3 days b. 4 -5 days *
   c. 5 - 7 days d. 8 -9 days

7. The composite which is cured in room temperature never be used in areas where
   a. operating temperature below 160^0 C
   b. operating temperature above 160^0 F *
   c. operating temperature below 160^0 F
   d. operating temperature above 160^0 C

8. Room temperature composite curing material is used
   a. light load
   b. as in (a) and non structural loads *
   c. heavy loads
   d. all of these

9. Most widely accepted method of curing structural composite employs
   a. resin
   b. higher temperature
   c. both a and b *
   d. none of the above

10. Why the adhesives and resins require elevated temp during their cure ?
    a. develop full strength
    b. reduce brittleness
    c. as in a and b and heat will reduce the curing time *
    d. all of the above are wrong

11. When too much heat is applied to the repair of composite structure
    a. vaporization
    b. gassing
    c. both a and b
    d. c and the matrix may cause bubbles to form on the surface *

12. Which will take higher temperature
    a. fibre * b. matrix
    c. both a and b d. resin

13. The composite material can be cured by
    a. step curing b. ramp and soak curing
    c. both a and b * d. forging

14. Which of the curing process is manually operated in case of composite material
    a. ramp and soak curing b. step curing *
    c. forging d. casting

15. Mark the correct statement regarding step curing
    a. bringing up the temp. slowly by raising the temperature to one point and holding it their then bringing it up again and holding it their until the curing temp. is reached. *
    b. bringing up the temp. rapidly by raising the temperature and holding it their until the curing temp. is reached.
    c. step by step curing the material
    d. bringing up the temp. rapidly by raising the temp and holding it their then bringing it down again holding it their until the curing temp. is reached.

16. Which type of cooling will give stronger final cure to the component
    a. rapid cooling b. slow cooling *
    c. water cooling d. brine cooling

17. Which of the curing method is more sophisticated and accurate curing
    a. step curing b. ramp and soak curing *
    c. both a and b d. none of the above

18. What is the constant rate of change from room temp. in curing period of composite
    a. 4^0 F per minute b. 8^0 F per minute *
    c. 8^0 C per second d. 8^0 C per hour

19. Which is the manuals used for repair composite structures
    a. structural repair manuals *
    b. maintenance manuals
    c. Q.C manuals
    d. overhaul manuals

20. Mark the correct statement
    a. use of heat lamps to cure composite parts is recommended
    b. use of heat lamps to cure composite parts is not recommended *
    c. sometimes heat lamps are used
    d. none of the above

21. Temple stick is a
    a. temperature monitoring device *
    b. pressure monitoring device
    c. volume monitoring device
    d. curing monitoring device

22. Drafts in the work area affect
    a. amount of heat * b. amount of matrix
    c. amount of resin d. amount of core

23. Temple stick is a
    a. powder b. gas
    c. crayon * d. brick

24. Heat guns may be used to cure
    a. composite structures *
    b. metal structures
    c. AI alloy
    d. none of the above

25. A typical heat gun can generate temperatures
    a. 500 to 600^0 F b. 500 to 750^0 F *
    c. 400 to 700^0 F d. 300 to 600^0 F

26. Heat gun is used to cure the component
    a. temp 350^0 F * b. temp 250^0 F
    c. temp 200^0 F d. temp 100^0 F

27. To keep the temp constant in heat gun
    a. rectifiers b. thermocouple *
    c. transistor d. all of the above

28. If the heat gun is focused in one place
    a. excessive evaporation of the resins in one spot.
    b. leave dry areas.
    c. reject the repair.
    d. all of the above.*

29. Holding the hot air around the composite component
    a. fabricate a tent * b. fabricate a plate
    c. both a and b d. none of the above

30. The tent used in composite curing is
    a. metal bagging b. vaccum bagging *
    c. sand bagging d. chalk bagging

31. Regarding the bagging film which one is correct
    a. cardboard box
    b. anything which will hold the heat
    c. vaccum bagging *
    d. all of the above

32. Which type of curing is frequently used by manufacturers
    a. heat lamp b. heat gun
    c. oven * d. stone

33. When using an oven for repair work
    a. the part must be removed from the aircraft *
    b. the part must be installed in aircraft
    c. both a and b
    d. none of the above

34. When an aircraft part has metal hardware the curing process
    a. should not be cured in an oven. *
    b. should not be cured in heat gun.
    c. should be cured in an oven.
    d. should be cured in heat gun.

35. Ovens which are used to cure composites
    a. must be certified *
    b. as in (a) for that purpose
    c. any type
    d. certification is not required

36. Autoclaves are usually used in the
    a. repair b. minor repair
    c. manufacture * d. major repair

37. Autoclaves are usually used in the
    a. manufacture b. remanufacture
    c. both a and b * d. none

38. If the damage is very large
    a. high heat and high pressure required *
    b. low heat and high pressure required
    c. high heat and low pressure required
    d. low heat and low pressure required

39. What is the most probably form of applying heat
    a. oven b. heating blankets *
    c. both a and b d. none of the above

40. Heat blankets are made of
    a. silicon * b. iron
    c. steel d. copper

41. Most manufacturers recommend the use of a heating blanket for curing because
    a. heat is not distribute evenly
    b. heat is distribute evenly *
    c. maintain the cold condition
    d. both b and c are wrong

42. Heat blankets are designed as
    a. very flexible b. flat head type
    c. both a and b * d. none

43. Set point is
    a. specified temperature * b. specified time
    c. both a and b d. specified duration

44. The thermocouple is placed beside the repaired area under a heat blanket for
    a. sense pressure b. sense temperature *
    c. sense volume d. none of the above

45. What is the final curing temp.
    a. 200^0 F b. 250^0 F *
    c. 300^0 F d. 450^0 F

46. In curing process of composites the resin mix with
    a. catalyst * b. cone
    b. resin d. all of the above

47. Mark the correct statement
    a. thermocouple is placed beside the repaired area under a heat blanket.
    b. the set point is 250^0 F
    c. not turn of the heat quickly and allow the part to cool too quickly.
    d. all of the above *

48. During the curing process the composite will get more strength in
    a. when applied heat b. during cooling *
    c. both a and b d. none of the above

49. If the cooling is too quick the part becomes
    a. more brittle b. less brittle
    c. brittle * d. none

50. If the climate is cold during curing
    a. it will take more time *
    b. it will take less time
    c. no effect on time
    d. none of the above

51. Composite matrix systems cure by
    a. heating b. ageing
    c. chemical reaction * d. none of the above

52. Composites, to obtain desired strength and quality, may be cured
    a. at room temperature
    b. by applying external heat
    c. by both above methods *
    d. by cooling below sub zero temperature

53. The strength of composite repair is directly affected by
    a. improper curing b. improper handing
    c. humidity d. all the above *

54. Some repairs may be cured
    a. at room temperature (65-80^0F) for 8-24 hours
    b. at accelerated temperatures (140-160^0F) to reduce curing time
    c. by either of the above method *
    d. at 800^0F and above

55. Full cure strength is usually not achieved until after
    a. 1 to 2 days b. 2 to 3 days
    c. 3 to 5 days * d. 5 to 7 days

56. Parts which are cured at room temperature cannot be exposed to operating temperatures of
    a. usually above 160^0F * b. 225^0F
    c. 300^0F d. none of the above

57. Composite parts cured at room temperature can only be used
    a. for non structural light loaded *
    b. for higher loads
    c. structural purposes
    d. any of the above

58. The most widely accepted method of curing structural composites employs the use of resin which cure at
    a. room temperature
    b. a little above room temperature
    c. higher temperatures *
    d. very-very high temperature

59. Structural campsites are cured by heating to
    a. develop full strength b. reduce time
    c. reduce the brittleness of resin
    d. obtain all above *

60. If a composit is manufactured at high temperature, its repair
    a. may be cured at room temperatures
    b. must be cured at the manufacturing temperatures *
    c. may be cured at any temperatures
    d. does not need heat curing

61. Structural resins are usually cured at
    a. 106-200^0F b. 200-250^0F
    c. 250-750^0F * d. 800-900^0F

62. If excessive heat is applied duringcuring, it may cause
    a. vapourization b. damage
    c. 'gassing' d. all above *

63. The recommonded temperature should not be extended because
    a. matrix will not withstand excess temperature
    b. the material may be de-laminated
    c. of all above *

64. It is most desirable to cure the composite
    a. by gradually increasing the temperature to final curing
    b. by controlling the cooling rate of composite after curing
    c. to adopt both above procedures *
    d. by fast increasing the temperature with faster cooling rate

65. Step cure method is the process when
    a. temperature is increased step by step by holding for specific time
    b. decreasing the temperature step by step by holding for specific time
    c. temperature is controlled manually by technician
    d. all above operations are performed *

66. Ramp and soak curing process is more
    a. sophisticated b. accurate
    c. both above * d. crude

67. Ramp and soak curing is done with
    a. manual regulator
    b. programmable controller *
    c. rheostate
    d. none of the above

68. When heating process is called the ramp, it means that
    a. temperature is raised at specific rate to reach to final in a given time *
    b. temperature is raised step by step in specified time
    c. temperature is quickly raised and dropped
    d. temperature is just raised above room temperature and cool

69. In ramp and soak curing, cooling is usually
    a. at the same rate as used for heating
    b. at the slower rate than heating *
    c. at the faster rate than heating
    d. not controlled

70. Structural repair manuals typically
    a. gives the ramp up and ramp down times
    b. will not give the ramp up and ramp dowm times
    c. as 'b' because room temperature vary from place to place & season
    d. as 'b' and 'c' the rates will vary according to room temperature *

71. usually the rate of increase and decrease of temperature adapted respectively per minute
    a. 8 and 5^0F * b. 6 and 8^0F
    c. 10 and 8^0F d. none of the above

72. Usually heat lamps are not recommonded for composite repairs, because
    a. it can not be controlled accuratly
    b. it may over heat the repair
    c. it provides only localised heat
    d. of all above reasons *

73. Though heat lamps are not good for composite repairs but may be used to accelerate room temperature cure with
    a. temple stick
    b. strip with temperature sensitive ink
    c. either of the above *
    d. none of the above

74. Temple stick is
    a. sensitive to temperature
    b. crayon which melts at rated temp
    c. a device to monitor temperature
    d. is as all said above *

75. Temperature sensitive ink changes
    a. colour at specified temperature
    b. colours when heat reaches a certain temperature *
    c. appearance of the repair
    d. nothing as said above

76. A typical heat gun can generate temperature of
    a. 350-450^0F b. 500 - 750^0F *
    c. 300 - 500^0F d. 800 - 1000^0F

77. Heat gun pre set temperature is controlled by
    a. variable resister b. manually by operator
    c. thermo couple * d. none of the above

78. When heat gun temperature reaches to pre set value, thermo couple
    a. cuts off the heat source to gun
    b. maintains the gun temperature by putting 'ON' and 'OFF' *
    c. stops functioning and controller takes over
    d. functions as above

79. Heat gun is having the problem, if it is fixed at one position on repair
    a. excessive evoparation of resin
    b. one spot may leave dry area
    c. repair becomes brittle due to matrix oversheet
    d. as mentioned in (a) and (b) *

80. Heat gun is usually used to cure
    a. flat surfaces b. contoured surfaces
    c. intricate shapes
    d. the repairs mentioned in (b) & (c) *

81. Why heat gun is prefered over heat blanket ? because
    a. it provides uniform heat
    b. its temperature is accurately controlled
    c. heat blankets some times lacks enough flexibility *
    d. of all above

82. Mark the incorrect statement about heat gun
    a. heat gun is pointed to repair at 250^0F temperature *
    b. if curing temperature is 250^0F, heat gun is not pointed to repair
    c. as a case in (b), a tent is formed to take the heat from gun
    d. as in 'c' tent is made of vacumm bagging film.

83. Heat guns are not left unattended during curing process because
    a. it may cause mechanical damage to repair
    b. it may present a fire hazard *
    c. it may over heat the repair
    d. of all above reasons

84. Oven curing offers
    a. controlled temperature
    b. uniform heating
    c. vacumm ports to provide vacumm pressure for curing
    d. all above *

85. Oven curing
    a. is frequently adapted by manufacturers
    b. can be done for repair of parts removed from aircraft
    c. is adapted usually for small part
    d. used as mentioned in (a), (b) and (c) *

86. When a composite part is attached with metal hardware, it should not be oven heated because
    a. metal heats faster than composites
    b. higher heated metal may deteriorate adhesives
    c. it may cause failure of bond
    d. of all above *

87. Oven heating is having its won draw back's i.e
    a. heat cannot be localised on repair area
    b. non repaired area may deteriorate due to overheating
    c. as said in (a) and (b) *
    d. it is very expensive and cumbersome process.

88. Auto claves are used for
    a. manufacturing the composites
    b. re-manufacturing
    c. repairs usually
    d. as in (a) and (b) *

89. Auto claves are used for manufacturing or the large repairs which needs original mold it provides
    a. high heat and high pressure
    b. pressure of one atmosphere
    c. additional pressure of two or three atmospheres
    d. heat and pressure as said in (a) and (c) *

90. Mark the correct statement about the auto claves
    a. parts are heated with controlled heat at curing temperature
    b. apart from vacumm laaging, additional pressure is applied
    c. autoclaves can be dangerous if not operated poperly
    d. all above statements are correct *

91. For composite repairs most widely used heating method is
    a. heat guns b. oven curing
    c. heat blankets * d. all above

92. Heat blankets can be used with
    a. controller
    b. hot patch bonding machine
    c. vacumm bagging
    d. all above *

93. Mark the correct statement regarding heat blankets
    a. these are made of a flexible silicon
    b. these are availble in variety of forms and sizes
    c. heating coils in blanket are powered controller regulated unit
    d. all above statements are correct *

94. In heat blankets to control the heat
    a. a thermo couple is used to monitor *
    b. temperature sensitive strips are used
    c. temperature sensitive ink is used
    d. any of the above may be used

95. Heat blankets provides a stronger composite cures because
    a. it is able to heat the past evenly
    b. ramp and soak method can be easily accomplished
    c. of both above qualities *
    d. heat blanket material is strong so it strengthen the repair

96. Size, selected of heat blanket should be such that
    a. it is equal to the size of repair
    b. it is an inch or two larger than repair *
    c. it is an inch or two smaller than repair
    d. it raps around the components

97. Mark the incorrect statement about heat blankets
    a. heat blanket is placed next to the repair
    b. heat blanket is vacumm bagged into repair area
    c. heat blanket is pressured by shot bags *
    d. (a) and (b) are the correct statements

98. Separate heat blankets are used for
    a. flat surface b. contours
    c. specific shapes d. all above requirements *

99. Customized heat blankets are made to the specific shape of a part and are most commonly used for
    a. all repairs
    b. same shape parts repaired repeatedly *
    c. flat surfaces d. contours

100. Hot patch bonding machine applies
    a. atmospheric pressure by means of vacumm pump
    b. heat by means of heat blanket
    c. both heat and pressure as above *
    d. none of the above

101. Mark the correct statement for hot patch bonding
    a. in some instances for hot patch bonding, the heat gun may be used
    b. heat is monitored by thermo couple and controller
    c. The specified temperature is called the set point
    d. all above statements are correct *

102. For composite curing temperature control system performs
    a. set point control mode
    b. ramp up, hold and ramp down mode
    c. temperature recording
    d. all above *

103. For curing a repair
    a. temperature not to be raised instantly
    b. resin must be given enough time to flow
    c. it is also important to not turn off the heat from cure point
    d. all above is important to be followed *

104. Mark the incorrect statement
   a. resin and catalyst react chemically very quickly *
   b. composites gain much of the strength during the cooling down
   c. slow cooling prevents part to become brittle
   d. resin and catalyst needs time to slowly start their chemical reaction

105. The function of the thermocouple is
   a. to sense temperature *b. to regulate temperature
   c. to record temperature d. none of the above

106. If monitor or controller is not available then, it is not possible to have
   a. set point mode
   b. ramp & soak mode
   c. temperature recording
   d. all above modesby applying external heat *

■■■

CHAPTER -92
JOINING OF COMPOSITES

1. Assembly of the structure from its constituent parts will involve
   a. Either bonded joints
   b. Either bonded or mechanically fastened joint
   c. Either bonded or mechanically fastened joint or both *
   d. None.

2. The commonly used types of load carrying joints made of composite laminates, is/are
   a. Mechanically fastened joints
   b. Adhesive joints
   c. Bonded joints
   d. All above *

3. Which of the following is/are spot mechanical joints
   a. Riveted　　b. Bolted
   c. Moulded on　　d. both a. and b.*

4. Which of the following is/are spot mechanical joints
   a. Riveted　　b. Bolted
   c. Threaded　　d. All. *

5. Which of the following is/are continuous adhesive joints
   a. Adhesive　　b. Adhesive - rubber
   c. Moulded on　　d. All *

6. Adhesive joints are highly sensitive to manufacturing deficiencies including
   a. Poor bonding technique
   b. Poor fit of mating parts
   c. Environmental effects
   d. All above deficiencies*

7. Which joints are used in critical and safety related applications
   a. mechanical *　　b. adhesives
   c. combined　　d. none.

8. Operating environment of joint include
   a. temperature *　　b. fatigue
   c. static strength　　d. all.

9. Advantages of bonded joint is
   a. excellent fatigue properties *
   b. simple process
   c. no residual stress problem
   d. all.

10. Disadvantage of bonded joint is
    a. stress concentration in adherends
    b. poor fatigue properties
    c. not sealed against corrosion
    d. none of the above *

11. Disadvantage of bonded joint
    a. inspection difficulty *
    b. poor fatigue properties
    c. large weight penalties
    d. all.

12. Advantages of mechanically fastened joints are
    i. positive connection
    ii. simple process
    iii. Simple inspection procedure
    iv. Residual stress problem.
    a. (i) and (iv)　　b. (i) and (ii)
    c. (ii) and (iii)　　d. (i), (ii) and (iii) *

13. Disadvantages of mechanically fastened joints is
    a. considerable stress concentration *
    b. residual stress problem
    c. complex joint configuration
    d. all.

14. Disadvantages of mechanically fastened joints are
    i. prone to fretting
    ii. prone to corrosion
    iii. large weight penalty
    iv. complex process
    a. (i) and (iv)　　b. (i), (ii) and (iv)
    c. (i), (ii) and (iii) *　　d. (i), (ii), (iii) and (iv).

15. The behaviour of mechanically fastened joints is influenced by
    a. material parameters
    b. configuration parameters
    c. fastener parameters
    d. all above parameters*

16. Fastener parameters include
    a. material parameters
    b. configuration parameters
    c. fastener type *
    d. all.

17. Fastener parameters include
    a. fastener type
    b. fastener size
    c. hole size
    d. all *

18. The primary design consideration for bolted joints includes
    a. joint strength
    b. fastener type
    c. local reinforcement
    d. all above *

19. Single lap joints are normally adequate for thin laminates
 a. upto about 5 mm in thickness *
 b. upto about 10 mm in thickness
 c. upto about 15 mm in thickness
 d. upto about 20 mm in thickness.

20. Tension failure is related to the
 a. net area through the fastener hole *
 b. shear area emanating from the hole edge
 c. projected area of the hole
 d. all.

21. Bearing failure is related to the
 a. net area through the fastener hole
 b. projected area of the hole *
 c. shear area emanating from the hole edge
 d. all.

22. Cleavage failure is a mixed mode failure involving
 a. tension b. bending
 c. shear d. both (a) and (b) *

23. Geometry of the joint includes
 a. hole size
 b. plate width
 c. distance of the hole from the edge of the plate
 d. all above *

24. The allowable stress is a function of the
 a. geometry of the joint
 b. clamping area
 c. moisture content
 d. all as in a., b. and c.*

25. Selection of fasteners for joining composites
 a. includes corrosion *
 b. doesn't include corrosion
 c. doesn't include head configuration
 d. both (b) and (c).

26. Ti - 6 Al - 4V is most commonly alloy used with
 a. carbon fibre reinforced composite structure *
 b. Al fibre reinforced composite structure
 c. Fe fibre reinforced composite structure
 d. Ti fibre reinforced composite structure .

27. The head angles in counter sunk fasteners is ranging from
 a. 10° to 50° b. 50° to 75°
 c. 75° to 100° d. 100° to 130° *

28. The major considerations in the design of a bonded joint can be grouped into
 a. two categories b. three categories
 c. four categories d. five categories *

29. The first step in the processing of adhesive joint is
 a. to detemine a dimensional configuration *
 b. to select an adhesive system
 c. to develop the process specification
 d. all.

30. Bond layer thicknesses are generally limited to a range of
 a. 0.001 mm to 0.01 mm b. 0.1 mm to 0. 2 mm
 c. 0.2 mm to 0.3 mm d. 0.125 mm to 0.40 mm.*

31. Stepped and scraf - joints are used where the thickness is
 a. more than 1.5 mm b. less than 1.5 mm
 c. more than 6.5 mm * d. less than 6.5 mm.

32. When using adhesives which load is considered in joint design
 a. shear * b. tension
 c. cleavage d. peel.

33. For composite adherends the bending failures are
 a. shear in nature b. brittle in nature *
 c. tensile in nature d. compressive in nature.

34. To prevent significant porosity from developing, bond thickness should be limited to the ranges of
 a. 0.02 to 0.04 mm b. 1 mm to 4 mm
 c. 4 mm to 5 mm d. 0.12 mm to 0.24 mm *

35. Surface pre-treatment requires removal of contaminantssuch as
 a. oils b. mold lubricant
 c. general dirt d. all above*

36. The selection of adhesives is based on the
 a. strength requirements over the expected service temperature range
 b. type of equipment available for bonding
 c. both (a) and (b) *
 d. none.

37. Adhesives can be categorized into following physical forms
 a. films b. pastes
 c foams d. all *

38. Paste adhesives have
 a. a long shelf life *
 b. require refrigeration
 c. higher strength properties
 d. all.

39. Adhesives for structural bonding have physical forms in which they are used as
 a. films b. pastes
 c. foams d. all *

40. The criteria for selection of adhesive is/are
 a. the thermal expansion of dissimilar materials *
 b. the thermal expansion of dissimilar materials are irrelevant
 c. that contamination of the bond line with moisture is non effective
 d. (b) and (c).

41. The major advantages of films adhesive are
    a. they are easier to apply
    b. do not require mixing equipment
    c. both (a) and (b) *
    d. all above.

42. The major disadvantages of films adhesive are
    a. that refrigeration is required for storage
    b. more expensive than paste
    c. require heat and pressure to achieve satisfactory bond
    d. all above negative points*

43. Pastes adhesives
    a. don't require refrigeration *
    b. require refrigeration
    c. are more expansive than film
    d. have a short shelf life.

44. Element testing should be performed to verify
    a. joint analysis *
    b. to obtain base line data
    c. dislocation
    d. all above.

45. Element testing should be performed to verify
    a. joint analysis
    b. failure mode
    c. location
    d. all above *

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CHAPTER - 93
SAFETY PRECAUTION

1. The composite materials are required to comply with the regulations of
   a. E.P.A (Environment all Protection Agency)
   b. O.S.H.A (Occupational Safety & Health Administration)
   c. S.A.C.M.A (Suppliers of Advance of Composite Materials Association)
   d. Both E.P.A & O.S.H.A *

2. According to M.S.D.S (Material Safety Data Sheets) a poison or poisonous substance that may cause a harmful effect on the body is called
   a. chronic b. toxic *
   c. hazardous d. none of these

3. Hazard is
   a. toxicity b. extreme toxicity
   c. exposure to toxicity * d. chronic toxicity

4. According to M.S.D.S risk describes
   a. probability of hazard *b. concentration of toxity
   c. frequency of hazard d. probability of toxicity

5. Acute toxicity occurs when
   a. a hazard occurs
   b. when harmful effect is experienced after short exposure *
   c. when harmful effect is experienced after long exposure
   d. when harmful effect is experienced after long or short times.

6. Chronic toxicity occurs when
   a. a hazard occurs
   b. when harmful effect is experienced after short exposure
   c. when adverse effect is experienced after long exposure *
   d. any of the above

7. Which of the following toxicity occurs following repeated exposures to chemical substances
   a. acute toxicity b. chronic toxicity *
   c. mild toxicity d. repeated toxicity

8. Sensitisation is
   a. allergic reaction * b. inflammatory hazard
   c. explosive reaction d. any of the a & b

9. People who are sensitised to one chemical may react to other similar materials. This is called
   a. allergic reaction b. cross - sensitisation *
   c. over sensitisation d. multi - sensitisation

10. Which of the following is not a basic requirement of hazard communication programme
    a. inventory
    b. labelling of material
    c. availability of M.S.D.S
    d. availability of first aid *

11. M.S.D.S provides information on
    a. material hazard b. safe handling
    c. toxicity * d. disposal procedures

12. M.S.D.S is classified into
    a. four sections b. six sections
    c. eight sections d. nine sections *

13. Good ventilation will minimise possible exposure and prevent
    a. skin and eye hazard b. inhalation hazard *
    c. ingestion d. injection

14. Thorough washing of hands prior to eating or smoking provides significant protection from the effects of
    a. inhalation b. ingestion *
    c. injection d. skin and eye

15. Exposures caused by skin contact with materials result in
    a. dermatitis b. sensitisation
    c. any of the above * d. none of these

16. An out of control exothermic reaction may occur under
    a. heating or mixing a resin too long
    b. heating a resin too fast
    c. contamination
    d. all the above *

17. Which factor does not start or extend an exotherm.
    a. variability in raw materials
    b. deviation from procedures
    c. contaminating chemicals
    d. even mixing of chemicals *

18. Epoxies cause
    a. possible skin sensitiser
    b. irritant to skin
    c. irritant to mucous membrane
    d. all the above *

19. Epoxies have
    a. high order of acute toxicity
    b. low order of acute toxicity *
    c. high order of chronic toxicity
    d. none of these.

20. Which of the following is false about hardness /curing agents
    a. they are irritating to skin and mucous membrane
    b. they can cause damage to internal organs
    c. they cannot cause the chest discomfort *
    d. they do not increase the ability of blood to transport oxygen to tissues

21. Fibres cause
    a. Possible skin sensitisation from the fibre sizing
    b. irritation of skin
    c. respiratory irritation
    d. all the above *

22. Only prolonged over exposure causes
    a. skin sensitisation b. irritation of skin
    c. lasting lung damage * d. respiratory irritation

23. Resins are
    a. mild irritants to skin b. strong irritant to skin *
    c. non toxic d. all the above

24. Only over exposure of resin may cause
    a. sensitisation b. eye irritation
    c. sinus irritation d. liver and kidney effects *

25. Off - gas materials may cause
    a. headaches b. dizziness
    c. any of the above * d. none of these

26. Solvents are
    a. mild to moderate irritants *
    b. strong irritants
    c. very strong irritants
    d. none of these

27. Dizziness and elevated blood levels of carboxy-haemoglobin are caused due to
    a. Epoxies b. resins *
    c. solvents d. fibres

28. Vomiting may cause acute chemical pneumonitis. This is accused by
    a. ingestion of solvents*b. respirating of fibres
    c. ingestion of resin d. none of these

29. Sensitisation of Cardiac Muscle, Central Nervous system depression and drowsiness are caused by
    a. Epoxies b. fibres
    c. resin d. solvents *

30. Thermal burns are major effects of
    a. resin * b. epoxies
    c. solvents d. hardness

31. Safety precautions observed during handling of composites fall into how many sections
    a. four sections * b. five sections
    c. six sections d. eight sections

32. To decrease the concentration of the different solvents and resins in the working area
    a. it should be cleaned
    b. hand gloves should be used
    c. ventilation should be provide *
    d. any of the above

33. Person working with composites should wear dust mask, face shield and safety glasses during
    a. machining b. sanding
    c. drilling d. all the above *

34. The gloves used should be
    a. chemically resistant
    b. mechanically resistant
    c. thermally resistant
    d. any of the above, depending on the job *

35. Which of the statement is not true about composite fibres
    a. composite fibres that became embedded in the skin should be removed immediately
    b. bending or flexing the filament makes them stronge *
    c. if not removed, the filaments tend to work themselves further into skin
    d. none of these

36. To avoid risk of in advert fire
    a. non spark producing tools should be used *
    b. hand gloves should be used
    c. person should work in no flammable environment
    d. all the above

37. Which of the following is not a precaution
    a. materials should be stored away from heat
    b. a hazardous materials must contain identifying labels
    c. during the in service repairs, the repair cart and aircraft should be grounded
    d. the first aid box should be within approach *

38. Composite surfaces should be cleaned with
    a. scouring powder b. harsh cleaning agent
    c. both a & b * d. none of the above

39. All removed particles after rubbing of composite surface should be removed by
    a. blowing water
    b. blowing oil
    c. blowing oil free air *
    d. blowing air from mouth

40. Graphite fibres should be disposed off by
    a. land fill burial * b. vacuum cleaner
    c. blowing oil free air d. none of the above

41. For handling solvents
    a. safety cans should be used *
    b. dark glass bottles should be used
    c. unlabelled jars should be used
    d. all of the above

42. To avoid the effect of solvents on lungs, skin and eyes
    a. the vapours should be blown away
    b. adequate protective clothing should be worn *
    c. respiratory protection should be worn
    d. both b & c

43. Solvent saturated clothes should be
    a. washed with good detergent
    b. dried in sun
    c. disposed off as per safety regulations *
    d. treated with normalising chemicals

44. After cleaning the surface with solvent
    a. the further work should be immediately started
    b. the surface should be dried with cloths
    c. it should be left open to allow the solvent to evaporate *
    d. none of the above

45. To remove all the traces of the solvents
    a. oil is used
    b. dry and compressed air should be used *
    c. vacuum cleaner should be used
    d. none of the above

46. While handling resins
    a. gloves should be worn
    b. ventilation should be provided
    c. eye / face protection should be worn for over head work
    d. all of the above *

47. Methyl Ethyl Ketone Peroxide (MEKP) causes
    a. explosion * b. sensitisation
    c. inhalation problem d. all of the above

48. Which of the following is necessary for wet lay up
    a. neoprene / chemical resistant gloves
    b. protective clothing
    c. eye goggles
    d. all of the above *

49. According to MSDS Physical Data includes
    a. concentration of ingreadients
    b. physical properties such as boiling point, vapour pressure etc. *
    c. fire and explosive data
    d. handling and storage data

50. Special protection data includes devices
    a. information regarding the need of special protection devices *
    b. special handling data
    c. ability of the material to react
    d. data regarding the nature of explosion

51. Safty precautions to be taken for particular type of composite can be learned from
    a. industrial safty catalog
    b. local safty regulations
    c. material safty data sheet (MSDS) *
    d. any of the above

52. MSDS contains information on
    a. health precaution and post accident management
    b. flammability of material
    c. ventilation requirements
    d. all above *

53. Resins are received with
    a. mixing instructions b. MSDS sheets
    c. constituents of resin d. a and b *

54. Usually the MSDS are kept with
    a. tool stores
    b. health professionals of company
    c. floor manager
    d. any of the above *

55. Mark the correct statement
    a. MSDS sheets should be accessible to concerned worker
    b. in case of accident the MSDS must accompany the victim
    c. MSDS sheets are kept with head of company under lock & key
    d. a and b are the correct statements *

56. To protect the skin from the hazardeous chemicals
    a. rubber gloves are to be used
    b. shop coats are to be worn over clothings
    c. in case of contact with chemical, clean immediately
    d. all above precautions are essential *

57. In case of contact with epoxy resin
    a. use special epoxy cleaners
    b. do not use excessively strong solvants to clean
    c. follow as per a & b *
    d. use the running water to clean the affected area

58. Use of excessively strong solvant for skin cleaning may cause
    a. drying of natural oils from skin
    b. allergic reactions
    c. skin to peep
    d. all above problems *

59. When working with resins and solvants, it is essential to
    a. have proper ventilation
    b. wear respirator for toxic resins
    c. wear respirator in unventilated environ
    d. abide by all above as applicable *

60. It is often necessary to apply the resin in an unventilated area, hence
    a. wear respirator when mixed resin is removed for application
    b. wear respirator when applying the resin
    c. wear respirator all the time, irrespective of environ
    d. wearing of respirator is most essential under a & b conditions *

61. Some of the composite materials have no known antidots and are lethaly hazardous. Hence
    a. keep hands and gloves away from mouth
    b. keep clothings away from mouth
    c. keep materials away from mouth
    d. keep gloves, clothing and material away from hands and mouth *

62. Some of the solvants and matrix can cause
    a. permanent dumbness b. permanent blindness *
    c. both of above d. none of the above

63. Goggles provide complete eye protection from
    a. front and side impact b. chemical splashes
    c. dust d. all above *

64. In the event of accidental contact of chemical with eyes
    a. immediately rinse the eyes
    b. take medical assistance
    c. do nothing till health prophessional arrive
    d. proceed as per a & b *

65. Some resin hardeners and solvents are very dangerous to eyes, therefore while working on them
    a. goggles
    b. face shields
    c. any of the above as feasible *
    d. use air tight helmet

66. Resin fumes may cause
    a. cracks on plastic lenses
    b. crazing of plastic lenses *
    c. blackening of plastic lenses
    d. any of above defect on plastic lenses

67. All solvents are inflamable hence do not use solvents
    a. in the vicinity of sanding
    b. in vicinity of bagging films and peel plies are unrolled
    c. in the vicinity of naked flame
    d. under all above conditions *

68. The solvent is used on part by
    a. pouring on the part
    b. applying it with moistened cloth
    c. applying with brush *
    d. any of the above method

69. Mark the incorrect statement regarding solvents
    a. use solvent in ventilated areas, avoid vapors
    b. gloves and goggles are not must to be used *
    c. use gloves and goggles
    d. keep solvent in origional containers

70. Labels on matrices containers contains the instructions regarding
    a. handling b. storage
    c. safty precautions d. all above *

71. For storing the resins and catalysts, the storage temperature range may be
    a. room temperature 75-80^0 F
    b. refrigeration of about 40^0 F
    c. freezer temperature of 0^0 F
    d. all above as required *

72. The discarded matrix material may be disposed of
    a. by just throwing in waist
    b. as prescribed in MSDS sheet *
    c. by burying under ground
    d. by any of the above method

73. For composite repairs
    a. the room must be specially cleaned
    b. there should be seperate rooms for sanding and laying
    c. both above is correct *
    d. clean rooms and seperate areas are not required

74. For composites, tools used for repair work are
    a. common tools
    b. super alloy tools
    c. non spark producing tools *
    d. none of the above

75. While machining the composites
    a. use of respirators is not essential
    b. respirators must be used *
    c. composite dust does not contaminate air
    d. only dust collector is to be used

76. Mark the incorrect statements
    a. some components de-compose while drilling/ trimming
    b. some components may emmit toxic fumes
    c. composites does not decompose under any machining *
    d. all composites are considered hazardous

77. Which statement is not concerned with tool safty
    a. air supply is to be disconnected while changing cutters
    b. carbon components are to be removed from aircraft for work *
    c. to clean dust vacumme cleaner is used instead of air pressure
    d. foam core material is cut with hot wire cutter

78. Carbon chips may be
    a. corrosive to aluminium *
    b. hazardeous to electrical components
    c. as a & b
    d. toxic

79. Working environment at composite shop is ideal
    a. where safty equipment is accessible
    b. if it is well ventilated with adequate waste disposal
    c. where storage facility for tools & materials are proper and adequate
    d. as all above with clean surroundings *

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CHAPTER - 94
MACHINING COMPOSITES

1. Machining of composites means
   a. drilling b. cutting
   c. grinding or sanding d. all above *

2. While machining the composites, the material acts
   a. traditionally as aluminium
   b. as high carbon steel
   c. differently with each type fabric *
   d. normal as metal

3. Before mixing with matrix, the fibre glass or carbon/ graphite can be cut with
   a. hot wire culter b. knife
   c. conventional fabric scissors *
   d. none of the above

4. Aramid fabric in its raw state is
   a. more difficult to cut
   b. cut with special steel blade with serrated edges *
   c. cut with hot wire cutter
   d. cut with any of the above as in (b) and (c)

5. The scissors used to cut raw aramid fibre are
   a. special steel bladed with serrations *
   b. ceramic bladed with serrations
   c. steel bladed with diamond cutting edge
   d. all of the above

6. Once a particular scissor is used for cutting particular fabric, it
   a. can be used on other type of fiber
   b. can not be used on other fibres
   c. is not inter changeable with other fibres
   d. is as said in (b) and (c) *

7. A Pre-preg material can be cut with
   a. razor blades in utility knife *
   b. hot wire knife
   c. fabric scissors
   d. any of the above

8. Typically accepted cutting fluid for composites is
   a. oil b. water *
   c. both above d. none of the above

9. Mark the correct statement
   a. machinery characteristics vary with type of fibre
   b. cutting tools are not inter changeable with other fibres
   c. some composites may decompose with high speed drillings
   d. all above statements are correct *

10. During machining, because of friction, the composites
    a. deteriorate b. generates toxic fumes *
    c. gets strongly cured d. decomposes

11. To drill a hole in composite is problematic and may cause
    a. de-lemination b. fracture or break out
    c. separation d. all above defects *

12. To counter the drilling problems
    a. a very sharp drill is to be used
    b. the material should be backed with wood
    c. very light or no pressure to be used when exiting backside
    d. all above should be followed *

13. When wood back up is not possible while drilling a blind hole
    a. drill stop is useful to limit the depth *
    b. drill is marked for accurate depth
    c. nill pressure is applied while drilling
    d. any of the above method may be adapted

14. Donot use cutting coolant while drilling
    a. honey comb core b. foam core
    c. fiber glass
    d. foam or honey comb core*

15. Mark the incorrect statement
    a. carbide drill cannot be used on all composites *
    b. carbide drills can be used on all composites
    c. diamond dust charged cutter are for fiber glass and carbon
    d. diamond dust cutters produce fuzzing on aramid

16. For composites high speed drilling with moderate pressure works best, with best included drill angle of
    a. 59^0F b. 118^0F
    c. 90^0F d. 135^0F *

17. Drilling on aramid composite creates fuzzing, the simple way to remove the fuzzing is
    a. to apply a quick curing epoxy to the fuzzed area
    b. as in 'a' once it is cured, fuzz is removed by filing *
    c. fuzzed threads are cut with scissors
    d. fuzzed threads pasted with epoxy

18. Special drills are designed
    a. specifically for aramid
    b. which does not create fuzzing in aramid
    c. for aramid with carbide
    d. to drill aramid as per (a), (b) and (c) *

19. A brad point bit with 'c' shape cutting edge
    a. is designed for aramid
    b. as in a can, produce good holes on fiber glass and carbon *
    c. is specially designed for foams
    d. is designed for foams but can be used on ceramics also

20. The Kevlar should be drilled
    a. at high speed b. with very sharp drill
    c. with less pressure d. as mentioned above *

21. Mark the correct statement
    a. fiber glass and carbon / graphites can be drilled normally
    b. carbide or diamond dust charged bits resists wear
    c. diamond dust charged drills are steel drills with diamond dust to cut
    d. all above statements are correct *

22. Drilled holes in carbon / graphite will show
    a. smaller than the drill dia
    b. larger than the drill dia *
    c. same as drill dia
    d. any way as above

23. Uni-drills
    a. can be used to drill and ream carbon / graphite
    b. can also be used on fibre glass for drilling and reaming
    c. will fuzz the aramid excessively
    d. are used or not used as above *

24. A counter sunk hole is important to use fastener on composite for
    a. proper fastener angle b. proper depth
    c. proper finish d. all above *

25. Common use of fasteners in composite structure are
    a. removable * b. non removable
    c. both of above d. none of the above

26. For carbon/graphite composites, fasteners used are made of
    a. titanium b. stainless steel
    c. aluminium d. all above *

27. Carbon/graphite composites tends to corrode
    a. titanium b. steel
    c. aluminium * d. all above

28. Hole filling fasteners like AN - 470 rivets are
    a. extensively used on composites
    b. not to be used on composites
    c. as in (b) because it expands
    d. as in (b) and (c) and can cause de-lemination of layer *

29. Close tolerance holes and fasteners ensures
    a. good grip b. proper finish
    c. equal load distribution *
    d. all above

30. Composite welding can be performed
    a. by applying heat & pressure
    b. on thermoplastic composites
    c. all types of thermo setting composites
    d. as per (a) and (b) *

31. Mark the incorrect statement
    a. composite welders are used on thermosetting during manufacturing
    b. thermo sets can be welded after it is fully cured *
    c. thermo sets can be welded only before it is fully cured
    d. all above is not correct

32. Sanding is used
    a. to remove single layers of fabric at a time
    b. widely during the repair operation
    c. with aluminium oxide grits on carbon/graphite
    d. as per (a) and (b) *

33. Wet sanding is preferred, using a fine grit sand paper of about
    a. 100 grits b. 150 grits
    c. 240 grits * d. 340 grits

34. Mechanical sanding is done at about
    a. 10000 rpm with 1", 2" or 3" disc
    b. 5000 rpm with 1", 2" or 3" disc
    c. 20000 rpm with 1", 2" or 3" disc *
    d. 2000 rpm with 1", 2" or 3" disc

35. If sanding carbon / graphite, the dust
    a. is blown away from the part
    b. should not be blown away
    c. should be collected in dust collector and vacummed
    d. is managed as (b) and (c) *

36. During sanding, to ascertain the removal of layer, look carefully for
    a. appearance of gloss area
    b. carbon/graphite layers
    c. wears of fibers and laminates
    d. all above as applicable *

37. Mark the correct statement for trimming
    a. all cutting surfaces should be carbide coated
    b. whenever possible diamond edged blades are used for carbon
    c. diamond edged blades works well on fiber glass
    d. all above statements are correct *

38. The most common types of routers operate at
    a. 25000 rpm b. 30000 rpm
    c. between both above * d. none of the above

39. A herring bone routes work best on
    a. aramid * b. carbon/graphite
    c. nomex d. all above

40. A diamond cut router bit works well with
    a. fiber glass b. carbon/graphite
    c. nomex d. all above *

41. Hole saws are
    a. used to cut holes
    b. not recommonded for aramid
    c. used on carbon/graphite
    d. used or not used as above *

42. Composite may be cut by water jets under pressure of
    a. 30000 psi b. 50000 psi
    c. between (a) & (b) *
    d. none of the above

43. For sawing composite, a band saw is used, with fine teeth per inch of
    a. 12-14 * b. 16-18
    c. 20-22 d. 22-24

44. Mark the correct statement
    a. counter bores are used to larger the holes
    b. during manufacturing, hydraulic press is used to cut pre-pregs
    c. laser cutting is done by focused light beam on composite
    d. all above statements are true *

45. Counter bores are not used on
    a. fibre glass b. aramid *
    c. carbon/graphite d. nomex

46. Which of the following is/are considered as post cure operations
    a. drilling b. milling
    c. cutting d. all above *

47. Surface delamination is
    a. separation of plies where the cutter enters and exits the material *
    b. separation that develops between plies as a result of improper machining and drilling
    c. tearing away of fibre from the wall of the machined edge
    d. all above.

48. Internal delamination is
    a. separation of plies where the cutter enters and exits the material
    b. separation that develops between plies as a result of improper machining and drilling *
    c. tearing away of resin from the wall of the drilled hole
    d. none.

49. Fibre pull-out is
    a. tearing away of fibre from the wall of the machined edge *
    b. tearing away of resin from the wall of the drilled hole
    c. tearing away of fibre from the wall of the drilled hole
    d. none.

50. Which of the following composites have their own machining characteristics
    a. graphite/ epoxy and aramid/epoxy *
    b. graphite/epoxy and aluminium/aluminium
    c. carbon/carbon and aluminium/aluminium
    d. aramid/epoxy and aluminium/aluminium.

51. PCD end milling cutters perform
    a. 60 to 100 times lesser than carbide cutters
    b. 10 to 50 times lesser than carbide cutters
    c. 10 to 50 times longer than carbide cutters
    d. 60 to 100 times longer than carbide cutters *

52. In conventional milling, the surface roughness is a function of
    a. fibre orientation b. cutting direction
    c. fibre direction d. all above *

53. To reduce cutting pressure on the laminate, we use
    a. two flouted end mill b. three flouted end mill
    c. four flouted end mill * d. five flouted end mill.

54. To keep laminate cooler, we use
    a. one flouted end mill
    b. two flouted end mill
    c. three flouted end mill
    d. four flouted end mill *

55. In conventional milling, fibre will be
    a. lifted up b. sheared *
    c. tense d. compressed.

56. When PCD tool is used in conventional milling the cutting speed is
    a. over 50 m/min b. over 100 m/min
    c. over 200 m/min d. over 300 m/min. *

57. In conventional turning, the part may require a finish cut moving from the
    a. largest diameter to the smaller diameter *
    b. smaller diameter to the largest diameter
    c. any
    d. none.

58. Common failure in conventional drilling of composite is/are
    a. delamination b. fibre break out
    c. separation d. all above *

59. Which of the following is major concern during conventional drilling
    a. Delamination * b. Fibre break out
    c. Separation d. all above.

60. High cutting speeds in drilling results in
    a. burn the matrix material *
    b. burn the composite material
    c. increase bond strength between the composite and matrix material
    d. none.

61. Which of the following is/are used for conventional drilling
    a. tungsten carbide
    b. micro grain tungsten carbide
    c. drill tool materials
    d. all above *

62. In conventional drilling, PCD tooling offers
    a. Increased tool life * b. decreased tool life
    c. poor hole quality d. lower machining rate.

63. In composite structures the fasteners commonly used are
    a. 0° included angle tension head
    b. 50° included angle tension head
    c. 100° included angle tension head *
    d. 150° include angle tension head.

64. In a composite structure the fasteners commonly used are5
    a. 10° included angle head
    b. 70° included angle head
    c. 120° included angle head
    c. 130° included angle head *

65. Which wheel is used for grinding composite material
    a. silicon carbide * b. aluminium carbide
    c. tungsten carbide d. boron carbide.

66. Abrasive water jet is used for linear profile
    a. cutting b. turning
    c. milling d. all above operations *

67. The cutting process parameters for AWJ include
    a. water jet pressure b. abrasive grain size
    c. abrasive material d. all above *

68. The width of cut in AWJ
    a. decreases as the feed rate increases *
    b. decreases as the feed rate decreases
    c. increases as the feed rate increases
    d. nothing above happens.

69. Harder abrasives used in AWJ for
    a. higher material removal rate *
    b. lower material removal rate
    c. finishing operation
    d. lower material removal rate and finishing operation.

70. Soft abrasive used in AWJ for
    a. higher material removal rate
    b. finishing operation *
    c. higher material removal rate and finishing operation
    d. none.

71. For piercing glass, the pressure range is
    a. 30 - 40 MPa * b. 300 - 400 MPa
    c. 400 - 500 MPa d. 500 - 600 MPa.

72. Advantage of AWJ is/are that
    a. dimensional accuracy is efficient
    b. temperature drops in cutting region
    c. suitable for wide range of composites *
    d. all.

73. Advantages of AWJ is/are that
    (i) dimensional accuracy is high
    (ii) suitable for wide rangeof composites
    (iii) no thermal stresses
    (iv) process can be automated
    a. (i) and (ii) b. (i), (ii) and (iii)
    c. (i), (ii) and (iv) d. (ii), (iii) and (iv) *

74. Disadvantage of AWJ is
    a. high thermal stress
    b. process cannot be automated
    c. not suitable for wide range
    d. dimensional accuracy is low *

75. Disadvantages of AWJ are
    (i) high thermal stress
    (ii) process cannot be automated
    (iii) dimensional accuracy is low
    (iv) temperature rise in cutting region.
    a. (i) and (ii) b. (i) and (iii)
    c. (ii) and (iii) d. (iii) amd (iv) *

76. The Nd-YAG laser operates
    a. near infra red region *
    b. away from infra red region
    c. near ultravoilet region
    d. none.

77. CO_2 gas laser operates in the
    a. near infra red region
    b. away from infra red region *
    c. near ultra voilet region
    d. none.

78. Nd-YAG laser is very effective in cutting
    a. graphite/epoxy composite materials *
    b. epoxy/epoxy composite materials
    c. carbon/carbon composite materials
    d. epoxy/carbon composite materials.

79. Advantage of laser machining is
    a. superior quality edges due to high temperature *
    b. No heat affected zone
    c. beam converge after its focal point
    d. all.

80. Maximum thickness which can be cut by laser machining
    a. about 1 mm b. about 5.5 mm
    c. about 7.5 mm d. about 9.5 mm. *

81. Disadvantage of laser machining is
    a. heat affected zone of varying dimensions *
    b. inferior quality edges
    c. non vaporization of the material in cutting zone
    d. all.

82. EDM of a composite, electrical resistivity should be
    a. less than 1 - 3 ohm/m *
    b. less than 10 - 13 ohm/m
    c. less than 100 - 103 ohm/m
    d. less than 50 - 53 ohm/m.

83. USM incorporates a tool vibrating at
 a. 20 Hz b. 20 KHz *
 c. 20 MHz d. 10 MHz.

84. USM is used for
 a. glass b. graphite
 c. ceramic d. all above *

85. For graphite, recommended abrasive is
 a. silicon carbide *
 b. boron carbide
 c. aluminium carbide
 d. any of the above.

86. For zirconia recommended abrasive is
 a. silicon carbide and aluminium carbide
 b. silicon carbide and sodium carbide
 c. silicon carbide and boron carbide *
 d. boron carbide and aluminium carbide.

87. For ceramic matrix composites recommended abrasive is/are
 a. silicon carbide * b. boron carbide
 c. both (a) and (b) d. aluminium carbide.

88. Silicon carbide adhesive is used when material is
 a. graphite
 b. zirconia
 c. ceramic matrix composites
 d. any of the above. *

89. The ideal condition for the amplitude of ultrasonic vibration is equal to
 a. grain mean diameter *
 b. greater than grain mean diameter
 c. lesser than grain mean diameter
 d. desired depth of machining.

90. A CNC USM can produce a controlled depth up to
 a. 50 mm * b. 100 mm
 c. 150 mm d. 200 mm.

91. Advantages of USM are where
 a. material hardness is not so important *
 b. any size is needed to be machined
 c. amplitude of ultrasonic vibrations is not important
 d. all above persist.

92. Disadvantage of USM is
 a. limited size can be machined *
 b. only conductive material can be machined
 c. hard material cannot be machined
 d. all above.

93. For countersinking of carbon fibre composites we use
 a. solid carbide drill
 b. cobalt high speed steep drill
 c. speed of 3000 RPM
 d. all of the above *

94. For drilling glass fibre composites we use
 a. high stainless steel drill *
 b. carbide twist drill
 c. aluminium twist drill
 d. all above.

95. Diamond coated routers are used for machining
 a. carbon fibre composite
 b. aramid fibre composite
 c. glass fibre composite
 d. all above composites. *

■■■

CHAPTER - 95
QUALITY CONTROL

1. Quality control is to ensure
   a. that uniformity does exist in the fabrication process
   b. operations performed as per specified guide lines
   c. correct materials are being used
   d. all above *

2. Quality control is achieved by
   a. quality of material
   b. manufacturing process
   c. design requirement
   d. all above*

3. quality control is a
   a. production environment *
   b. safety environment
   c. storage environment
   d. all above.

4. For good quality control of the composite parts, the porosity content is
   a. less than 1 - 2 % * b. less than 10 - 12 %
   c. less than 20 - 22 % d. less than 30 - 32 %.

5. A logical approach to the quality control of a laminated composite is
   a. two fold b. three fold
   c. four fold * d. five fold.

6. The most common fibre property used in composite quality control is
   a. longitudinal tensile strength *
   b. shear strength
   c. bending strength
   d. compressive strength.

7. The most common fibre properties used in composite quality control are
   a. longitudinal tensile strength and failure strain *
   b. failure strain and bending stress
   c. tensile strength and shear stress
   d. none of the above

8. Quality control of resins involve
   a. chemical and physical properties
   b. chemical and mechanical properties
   c. mechanical and physical properties
   d. chemical, physical and mechanical properties *

9. Component material tests covers
   a. only chemical property *
   b. both chemical and mechanical properties
   c. both physical and mechanical properties
   d. mechanical property only

10. Epoxy per equivalent weight test is used to
    a. determine the epoxide contents per unit weight of resin *
    b. determine the epoxide content per unit weight of matrix
    c. determine the epoxide content per unit weight of composite
    d. all above.

11. Infrared spectroscopy (IR) is done to
    a. determine melting point
    b. determine boiling point
    c. identify functionality *
    d. determine molecular weight.

12. Hydrolyzable chloride test is done to
    a. determine chloride content *
    b. determine hydrogen content
    c. determine zinc content
    d. determine all above.

13. Amine equivalent test is done to determine
    a. number of hydrogens per unit weight *
    b. number of ammonias per unit weight
    c. number of alumin as per unit weight
    d. all above

14. GPC test is used to
    a. determine molecular weight distribution of resin *
    b. determine molecular weight distribution of matrix
    c. determine relative weight distribution of matrix
    d. determine relative weight distribution of resin.

15. Physical property test includes
    a. gel time test b. GPC *
    c. IR d. HPLC.

16. Physical property test includes
    a. gel time test and GPC
    b. GPC and IR
    c. GPC and viscosity determination *
    d. viscosity determination and HPLC.

17. Chemical property tests includes
    a. gel time test and IR *
    b. IR and GPC
    c. GPC and viscosity
    d. viscosity and IR.

18. Prepreg tests includes
    a. chemical property and physical property *
    b. chemical property and mechanical property
    c. mechanical property and physical property
    d. only chemical property.

19. Tack test to evaluate
    a. sticking characteristics of the prepreg composite *
    b. substracting characteristics of the prepreg composite
    c. resin weight
    d. percentage of resin.

20. 90°/0° tension strength and modulus for lamina property the specimens per sampler are
    a. two b. four
    c. six * d. eight.

21. Environment parameters for producing composite materials are
    a. minimum temperature 18°C and relative humidity 60% *
    b. minimum temperature 28°C and relative humidity 60%
    c. minimum temperature 38°C and relative humidity 660%
    d. minimum temperature 18°C and relative humidity 20%.

22. Environment parameters for producing composite material is
    a. maximum temperature 24°C and RH 45% *
    b. maximum temperature 34°C and RH 25%
    c. maximum temperature 44°C and RH 45%
    d. maximum temperature 24°C and RH 25%.

23. Final acceptance procedure must ensure that the component meet its
    a. functional requirements
    b. design requirements
    c. both (a) and (b) *
    d. functional and cost requirements.

24. NDI technique used for final acceptance is/are
    a. visual b. audio sonic
    c. radiography d. all *

25. Specimens per sample for lamina density is
    a. one b. two
    c. three * d. four.

26. Quality control means
    a. manufacturing as per customers requirement
    b. manufacturing to the companies profit
    c. uniformity, intended operations as per standard guidelines *
    d. procedure to manufacture very quickly.

27. Quality control in a production environment involves inspection and testing of at all stages
    a. true * b. false
    c. may be correct d. none.

28. Regarding composite material, test must also be performed by
    a. transpoter of material b. processer of material *
    c. supplier of material d. none of the above.

29. Some of the common quality control test performed on finished goods are
    a. raw material test
    b. inprocess control test, non-destructive test, performance test *
    c. cost control methods
    d. all the above

30. In quality control procedure, the material & process specifications should include
    a. fibre, matrix and cured component properties *
    b. cost of the material
    c. methods of transpotations
    d. none of the above.

31. The one of the factor which help in ensuring good quality of composite parts are
    a. constant Refrigeration of resin's before use *
    b. putting in a good container
    c. using always fresh batches of material
    d. all the above

32. In order to minimise polymerisations on the resins the method adopted is
    a. periodical heating of the resins
    b. constant refrigeration of resins *
    c. mixing with some other chemicals like TBLS, LS, CS etc.
    d. none of the above.

33. Monitoring of the material life cycle is done since
    a. as the properties change even if the material is stroed properly *
    b. just to keep the place neat & clean
    c. to make loading of M/Cs easy
    d. to minimise manforce.

34. Special manufacturing machines and surfing of composites are done in order to
    a. to increase companies profit
    b. to reduce the mannual work force
    c. just to ensure good quality control of composites *.
    d. all of the above

35. Monitoring of cure cycles are done constantly just because
    a. to ensure fast and to suit production needs *
    b. to reduce the cost
    c. to reduce the cyclic time
    d. all of the above.

36. The maximum amount of allowable low void or porosity content is about
    a. 5 to 10 % b. 15 to 25 %
    c. exactly 7 % d. less than 1-2 % *

37. What do you understand by the word proper level of laminate consolidation ?
    a. proper content of and distribution of resin & fibre volume.*
    b. process to do the component to look attractive
    c. to make the production process quick
    d. none of the above.

38. A logical approach to the quality control of a laminated composite is of
    a. eight fold b. six fold
    c. four fold * d. two fold.

39. The difference between QC & QA is
    a. QC is done till the stage of manufacturing, QA is for performance of finished product *
    b. QC for factory worker & QA for customer
    c. QC is to control material but QA is to control cost
    d. none of the above.

40. Which one in below is the one of the procedure for validation of raw material
    a. matrix materials must be subjected to chemical characterisation test *
    b. raw materials must be kept in air conditioned store.
    c. must be kept in open sunlight
    d. all of the above.

41. Samples of raw materials are tested to engineering and manufacturing requirements for the confirmity of
    a. physical, chemical, mechanical and processing properties *
    b. with standing of stability criterio
    c. customer satisfaction
    d. cost control.

42. The quality control procedure for structural adhesive provides the assurance that
    a. each incoming batch conforms to chemical, physical and mechanical properties of standard one. *
    b. cost is very cheap
    c. to assure the fast production
    d. all of the above.

43. Quality control of reinforcing fibres involves
    a. test on single fibre yarns & standards. *
    b. only for the laminated fibre
    c. all of the above.

44. The most common property of fibres used in composite quality control are
    a. Longitudinal tensile strength *
    b. lateral compressive strength
    c. yield strength
    d. all of the above.

45. Elastic modules, failure strain are what ?
    a. name of chemicals used in composite material
    b. the most common property of fibres used in composite quality control *
    c. uarieties of composite material
    d. none of the above.

46. To determine the epoxide content per unit weight of resin the procedure used is
    a. hudrolyzable chloride
    b. infrared spectroscopy
    c. chromato graphy *
    d. epoxy per equivalent weight

47. What is the need to determine chloride content in epoxy resin ?
    a. since it is made up of chlorinated compound *
    b. to find out the cost
    c. to find out the processability
    d. all of the above.

48. Why softening test is carried out in resin ?
    a. to defermine melting point
    b. since viscosity of resin affects system processibility *
    c. to identify functionality.

49. Infrared spectrocopy is performed in resin because of
    a. to identify moisture content
    b. to determine the melting point
    c. to identify the functionality *
    d. none of the above.

50. What does high performance liquid chromotography provide ?
    a. a signature of the components separated by chemical functionality *
    b. the melting point
    c. the point of viscosity
    d. the moisturing point

51. Gel permeation chromatography is a test used to find
    a. melting point
    b. viscosity
    c. moisture content
    d. to define the molecular weight. *

52. To determine number of hydrogen per unit weight, the test used is
    a. amine equivalent test *
    b. epoxy per equivalent test
    c. softening point test
    d. none of the above.

53. The gel time test, moisture content test, infrared spectriscope are
    a. mechanical property test
    b. chemical property test *
    c. physical test
    d. none of the above.

54. The test of physical & chemical properties together are called
    a. prepreg test *
    b. chromotography
    c. mixed resin system test
    d. none of the above.

55. The name of the test used to ensure that material has the ability to form suitable composite components is
    a. resin content test *
    b. resin solid test
    c. tack test
    d. drape test.

56. To evaluate the sticky characteristic of the preprog composite, the test performed is
    a. drape test
    b. tack test *
    c. resin content test
    d. none of the above.

57. The ability of prepreg to be formed around defined radii the test used is
    a. tack test b. chromotography
    c. drape test * d. none of the above.

58. To determine the uncured prepreg properties the test performed is
    a. acceptance test *
    b. Revalidation test
    c. performance test
    d. all of the above.

59. To determine the important design features what test issued ?
    a. physical property test
    b. mechanical property test *
    c. chemical property test
    d. Thermal property test

60. The manufacture of acceptable and reliable composite structure is dependent upon
    a. process control employed during fabrication cycle*
    b. cost control used
    c. design consideration
    d. all of the above.

61. The working area's temperature and humadity range for the good quality of composite materials are
    a. 18^0 & 60% 24^0 & 45% *
    b. 25^0 & 75% 30^0 & 35%
    c. 21^0 & 55% 29^0 & 40%
    d. none of the above.

62. Destructive tests of speciman is carried out to ensure
    a. confirmity to the specified physical & mechanical properties. *
    b. confirmity to the specified chemical & thermal properties
    c. confirmity of to the specified metallurgical property

63. Non-destructive testing of specimens verifies that
    a. discrepancies caused by material selection
    b. discrepancies caused by fabrication process *
    c. fault due to poor workmanship
    d. none of the above.

64. The use of NDI equipments and procedures are to evaluate
    a. for accepting & rejecting the material crawl
    b. for accepting & rejecting cured structures *
    c. for selection of good performers
    d. all of the above.

65. The performance of the sandwich construction process may be evaluated by the sample made up of
    a. panels & by same production methods *
    b. by a model prepared specifically
    c. any one of the product already constructed
    d. none of the above.

66. Relationship of temparature, time and pressure in the cure and post cure cycles are defined because
    a. to have proper consolidation of cure reaction *
    b. to control the cost
    c. to minimise the wastage
    d. all of the above.

67. The main standard required for application of adhesives are
    a. very cleaned surface
    b. smooth & chemically treated surface
    c. coating of adhesives with wetting of surfaces and exclusion of air in the adhesive. *
    d. none of the above.

68. Checks for the manufacture of composite materials are through
    a. master model, patterns, composite tools. *
    b. any pcs picked out from the manufactured lot
    c. while in the process of production
    d. none of the above.

69. Composite tools can be a
    a. tougher proportions
    b. prepreg or wet lay-up *
    c. very soft combination
    d. all the above.

70. The pattern is covered with vaccum bay for the tool fabrication of
    a. wet lay of
    b. prepreg *
    c. both a & b
    d. none of the above.

71. Gel coat application is used for the fabrication of
    a. wet lay of * b. prepreg
    c. a and b d. none of the above.

72. Aerosols are controlled in the process inspection because
    a. for the consistent with the drawing
    b. to stop the prevention of adjustment of plies from curing together *
    c. to minimise the cost
    d. all the above.

73. Ply pattern must be stored
    a. on a air conditioned room
    b. in containers
    c. on a flat supporting structure *
    d. all the above methods.

74. Contiguration control is done in quality control dept. since
    a. to prepare final acceptable record *
    b. to choose the material
    c. just to confirm the design requirement
    d. for the customer satisfaction.

75. If the proper storage under environmental conditionare not met then composite material and adhesives are subjected to
    a. poor quality product
    b. deterioration *
    c. pastry form
    d. all of the above.

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CHAPTER - 96
DEFECTS IN COMPOSITES

1. In general the defects in composites are classified into
   a. Two categories b. Three categories
   c. Four categories * d. None

2. Prepreg defect includes
   a. Surface wrinkles * b. Poor process
   c. Mis alignment of a ply d. All

3. Prepreg defect is due to
   a. Poor storage * b. Poor process control
   c. Improper bolting. d. All

4. Manufacturing defects includes
   a. Poor process control ,handling and service *
   b. Poor storage and poor process control
   c. Poor storage , handling and service
   d. Poor storage and improper bolting

5. Process related defects are -
   a. Misalignment of a ply and omission of plies *
   b. Misalignment fibre tows and variation in ply thickness
   c. Misalignment of a ply and fibre tows
   d. Variation in ply thickness and introduction of inclusions.

6. Defects due to poor process are -
   a. Porosity and delamination *
   b. Porosity and gaps between fibre tows
   c. Delamination and gaps between fibre tows
   d. None

7. Porosity is due to
   a. Presence of volatiles b. Loss of cure pressure
   c. Presence of solvent d. All above *

8. Handling defects mainly results from
   a. Surface flaws * b. Delamination
   c. Loss of pressure d. All

9. Delamination is due to
   a. Failure to remove the prepreg peel ply
   b. Inclusion of non-adhering foreign objects
   c. Inadvertent use of moist prepreg
   d. All above *

10. Handling defects are due to
    a. Surface damage b. Scratches
    c. Gouging d. All above*

11. Handling defect is due to
    a. Gouging * b. Cratering
    c. Mis- drilled hole d. None of the above

12. Defect due to bolting is
    a. Gouging
    b. Mild flaws
    c. Surface damage
    d. Cratering on the hole surface *

13. Flawed fastener holes include loss of strength which is
    a. Less than 10% of the overall strength of the laminate *
    b. Less than 20% of the overall strength of the laminate.
    c. Less than 40% of the overall strength of the laminate.
    d. None

14. Defects during bonding includes
    a. Gouging
    b. Mild flaws
    c. Cratering
    d. Non - uniform bond line thickness *

15. Reduction in compressive strength due to large end gap and complete disbonding at the last step location is of the order of
    a. 5% b. 10%
    c. 15% * d. 20%

16. A major cause of in service damage to composite structure is due to
    a. Velocity impact * b. Pressure impact
    c. Tension impact d. All above impacts

17. When the indentation due to impact, is more than about 25 mm in size on surface , it is called
    a. Visible impact damage *
    b. Invisible impact damage
    c. Non destructive damage
    d. (a) and (c)

18. Surface oxidation is due to
    a. Overheating * b. Under heating
    c. Very high pressure d. Both b & c

19. Commonly experienced, in service damages are
    a. Surface impact ,edge effect and surface indentation
    b. Fastener hole wear / elongation due to overload
    c. Delamination and dents
    d. All above*

20. Commonly experienced environmental defects are
    a. Disbonding & delamination
    b. Surface oxidation and core corrosion
    c. Surface swelling and surface oxidation
    d. All of the above *

21. What are the defects and damages, composites are susceptible to
    a. matrix cracking
    b. disbonding at fibre-matrix interface
    c. fibre breakage
    d. all of the above. *

22. The reason for the defects include
    a. environmental loading
    b. in-service loading
    c. both *
    d. none of the above.

23. Prepreg defects includes
    a. gaps and overlaps between fibre tows
    b. resin rich/starved areas, cured resin particle, foreign material etc.
    c. both *
    d. none.

24. Variation in ply thickness and no. of tows, which affect the dimentional tolerance of a .... defect.
    a. prepreg * b. manufacturing
    c. in-service d. environmental.

25. Misalignment of fibre tows, which is normally parallel to .... centreline.
    a. manufacture b. prepreg *
    c. in-service d. environmental.

26. "Inadequate fibre impregnation" is a defect of
    a. in-service b. manufacturing
    c. prepreg * d. environmental.

27. .... defects are caused due to poor process control, handling and service, improper bolting and faulty bonding
    a. prepreg b. manufacturing *
    c. in-service d. environmental.

28. In addition to poor process control, which else can also cause delamination in manufacturing defects
    a. voids
    b. handling
    c. faulty drilling procedure *
    d. none of the above.

29. The defects arising in the laminated composites parts due to poor process control include
    a. misalignment of a ply b. delamenation
    c. both * d. none.

30. Omission of piles is a defect in laminated composite parts in
    a. prepreg b. poor process control *
    c. both d. none.

31. Cracks in the matrix is in
    a. prepreg b. poor process control *
    c. in-service d. none.

32. Causes of process related defects are
    a. porosity or voids b. delamination
    c. both * d. none.

33. Porosity or voids are generally due to
    a. absence of volatiles
    b. presence of pressure
    c. presence of volatiles solvents *
    d. none of the above.

34. Loss of cure pressure during laminate processing is in
    a. delamination
    b. porosity
    c. voids
    d. porosity or voids. *

35. Effect of porous laminate on structural integrity is the loss of structural performance when subjected to
    a. in-plane compressive load
    b. out-plane compressive load
    c. interlaminar shear load
    d. both a and c. *

36. Delamination is returned to as
    a. separation between adjacent piles in a laminate *
    b. adjacent piles
    c. structural intigrety
    d. none of the above.

37. Delamination is introduced during lay-up due to
    a. failure to remove the prepreg peel ply
    b. inclusion of non-adhesing foreign objects
    c. inadvertent use & moist prepreg
    d. all of the above. *

38. If the delaminaters are located near the surface of a part under compressive load, local instability results causing ....
    a. chucking b. buckling *
    c. inadvertent d. none.

39. Factors affecting the loss of compressive strength in the laminates, due to lamination are
    a. dimentionless size
    b. delamination size
    c. location
    d. delamination size of location and material properties. *

40. Surface flaws are mainly
    a. process related defects
    b. prepreg defects
    c. handling and surface related defects *
    d. all of the above.

41. Surface flaws are
    a. surface damage and scratches
    b. gouging
    c. mild flaws
    d. all the above *.

42. Identation is a
    a. surface flaws *
    b. delamination
    c. defect during bonding
    d. none of the above.

43. Cratering on the hole surface is
    a. defect on surface
    b. defects during bolting *
    c. defects during bonding
    d. none of the above.

44. Defect during bolting results in
    a. locating defects around a hole such as delamination
    b. mis-drilled hole
    c. both *
    d. none.

45. Flawed fastener holes indudce slight loss of strength, which is less than even .... of the overall strength of the laminate.
    a. 5% b. 10% *
    c. 15% d. 20%.

46. Strength loss due to severe porosity, improper fasterner seating depth is of the order of (select the appropriate alternative).
    a. 10 - 20% b. 20 - 30%
    c. 30 - 50% d. 20 - 50% *.

47. Poor bonding quality is the result of
    a. defect during bolting
    b. defect during bonding *
    c. defect due to handling and servicing
    d. none of the above.

48. Defects during bonding include
    a. cracks in the adhesive layer
    b. disbonding or separation along the adhesive bond line.
    c. both *
    d. none.

49. Weakly bonded regions are the defects during
    a. bolting b. bonding *
    c. cracking d. none.

50. Disbonding of core ribbons at the nodes in a sandwitch construction is
    a. defects during bonding *
    b. defects during bolting
    c. none
    d. both a and b

51. Large end gaps and complete disbonding at the last step location results in a compressive strength reduction of the order of the
    a. 10% b. 10 - 15%
    c. 15% * d. 20%.

52. In-service defects are due to
    a. high velocity impact
    b. low velocity impact *
    c. complete disbonding
    d. none of the above.

53. Surface impact, edge or corner impact, surface indentation or face sheet disbonding due to walking are
    a. in-service defect *
    b. out-service defects
    c. defects due to handling
    d. due to bonding.

54. In-service defects generally occur due to
    a. mishandling and impact damage *
    b. handling and impact damage
    c. due to bolting defect
    d. none of the above.

55. Fastener hole wear/elongation is due to
    a. overload or bearing failure *
    b. impact damage
    c. mishandling
    d. none of the above.

56. Overload failure results in
    a. impact damage
    b. mishandling
    c. both a and b
    d. none of the above. *

57. Service induced damage of concern is low velocity impact damage by a
    a. soft object b. versatile object
    c. hard object * d. volatile object.

58. A blunt impactor may not cause any visible damage on the surface but may cause severe .... damage.
    a. external b. internal *
    c. composite d. simple.

59. The extent of damage in in-service damage is primarily dependent on
    a. impactor size b. impact energy
    c. impact location d. all of the above. *

60. When the indentaion due to impact is more than about 1" in size on the surface, it is returned to as
    a. invisible impact damage
    b. visible impact damage *
    c. both a and b
    d. none of the above.

61. Visible impact damage has indentation due to impact is more than about
    a. 25 mm b. 1"
    c. both * d. none.

62. Service-induced damages are
   a. the growth of existing flaws
   b. delamination
   c. cracks
   d. all the above. *

63. Environmental hazards to the composite structure
   a. atmospheric electricity
   b. moisture
   c. chemical contaminater
   d. all of the above.*

64. Atmospheric electricity can have .... effects on ....
   a. crippling effect, metals
   b. crippling effect, non-metals *
   c. drippling effect, metals
   d. drippling effect, non-metals.

65. Moisture plasticeses resins, ... their mechanical properties and .... their glass transition temperature.
   a. upgrades, lowers   b. degrades, higher
   c. degrades, lowers *   d. upgrades, higher.

66. Vulnerability of polymers to fluids is
   a. environmental hazards to the composite structures *
   b. environmental hazards to the simple structures
   c. environmental hazards to the volatile structures
   d. environmental hazards to the non-volatile structures.

67. Organic matrix composites typically absorb between .... of their dry weight in moisture under normal service conditions.
   a. 1 - 5%   b. 1 - 6%
   c. 1 - 2% *   d. 2 - 5%.

68. .... is a phenomenon that affects primarily th resin matrix and secondarily non-metallic core made from aramid fibres
   a. moisture evaporation
   b. moisture absorption *
   c. dryness absorption
   d. none of the above.

69. Resin system cured at .... or above are more resistant to moisture pick up than resin systems used at lower temperature which includes all room temperature cured repair resins and cold bond adhesives.
   a. 170^0 Cand 340^0 F   b. 180^0 C and 350^0 F
   c. 170^0 C and 350^0 F *   d. 180^0 C and 340^0 F.

70. Aircraft fluids and chemicals can destroy a composite if allowed to penetrate its
   a. lower protective layers *
   b. outer protective layers
   c. none of the above
   d. both a and b.

■■■

CHAPTER - 97
SETTING UP SHOP

1. Many companies are hesitant to set up a repair shop because of
   a. lack of equipment and facilities
   b. lack of experienced technicians
   c. lack of access for an aircraft repairs
   d. all above *

2. To store composites usually temperature ranges adopted are
   a. 75 to 80^0F b. 40^0F
   c. 0^0F d. all three of above *

3. Freezer space must be available for most structur al grade
   a. pre-pregs b. adhesives
   c. both above * d. fibres

4. To dispose off the hazardous life expired material
   a. it is buried underground
   b. container seals are not opened
   c. it is first cured and then disposed *
   d. nothing of above is done

5. It is essential to store in original packs the material, such as
   a. fabrics
   b. core material
   c. honeycombs and foams *
   d. all above

6. Mark the correct statement for working environment of a composite repair shop
   a. it should be well ventilated with down draft table & dust collector
   b. it should have fire protection and first-aid post with eye wash
   c. it should have seperate areas for sanding and laying ups
   d. all above statements are correct *

7. Composite materials are
   a. cheaper than aluminium
   b. costlier than super alloys
   c. five to ten times costly than aluminium *
   d. much cheaper than metal

8. For repairs vacumm bagging material is used for curing at
   a. high temperature
   b. very high temperatures
   c. low temperatures *
   d. freezing temperatures

9. Dust masks which filter to five microns are used, when
   a. sanding b. drilling
   c. trimming d. all above is done *

10. The equipments needed to set an repair shop are such as
    a. machining, vacumm bagging and safety equipment
    b. lay up tools, heat curing and hot patch bonding equipment
    c. air conditioning, heating and vacumm bagging
    d. mentioned in (a) and (b) *

11. To work on composites, technical expertise is must for
    a. technicians and inspectors
    b. managers and critical maintenance personnel
    c. each and every body working in the complex
    d. those mentioned in (a) and (b) *

■■■

CHAPTER - 98
ASSESSMENT & REPAIR

1. Damages on composites are classified as
   a. repairable, non repairable, beyond economical repair
   b. negligible, repairable, non repairable *
   c. negligible, repairable, remanufacturable
   d. repairable, non repairable, beyond economical repair

2. Non repairable part is replaced and the damaged one is
   a. rejected
   b. repaired
   c. re-manufactured *
   d. turned to raw material

3. For laminated carbon epoxy skin negligible damage includes
   a. scratches on protective glass ply
   b. dent upto 0.010" depth
   c. panel edge damage upto 0.125" X 6.0" size
   d. all above *

4. Repairable damage on laminated Carbon / Epoxy structural skin are those where
   a. scratches upto 0'030" depth of less than 3.25" dia
   b. surface damage less than 1.0" dia and 0.085" depth
   c. either of above occurs *
   d. damage is more than the limit mentioned in (a) and (b)

5. Cosmetic defect is a defect which
   a. occur on outer surface and does not involve fibre
   b. is caused by chipping or scratching
   c. does not effect the strength of the part
   d. is as mentioned in (a), (b) and (c) *

6. Impact damage occurs
   a. if struck by a foreign object
   b. due to careless handling during transportation
   c. due to mishandling in storage or by stationary equipments
   d. due to all above reasons *

7. Impact damage may cause
   a. nicks, chips
   b. cracks
   c. breaking away pieces *
   d. any of the above

8. Delamination may be caused due to
   a. impact
   b. moisture in the fabric
   c. lightening strike
   d. all above *

9. Air pockets between layers of fabric may cause de-lemination of composite, due to
   a. improper resin or catalyst
   b. improper weighing or mixing
   c. dirt, greese or inadequate heat and pressure
   d. all above *

10. Mark the correct statement
    a. cracks can occur in advanced composites
    b. all cracks can be seen visually
    c. all cracks cannot be detected visually, NDT may be adapted
    d. (a) and (c) are the correct statements *

11. Hole damage may occur from
    a. impact damage or over torqing *
    b. drilling at wtrong locations
    c. oversize drilling
    d. drilling wrong number of holes

12. Visual inspection of composite is carried out to detect
    a. cracks and surface irregularities
    b. delamination
    c. blistering
    d. all above defects *

13. To detect cracked or broken fibre
    a. X-ray is required
    b. ultrasonic inspection is done
    c. a light and magnifying glass is needed *
    d. none of the above is done

14. De-lemination can be checked
    a. visually with a bright light on shown on surface
    b. as in (a), delemination may appear as bubble or dent
    c. by tapping with a coin and listen the change of sound
    d. as all above *

15. Ultra sonic inspection is carried out for
    a. surface irregularities
    b. surface damages
    c. internal damages *
    d. all above

16. Mark the incorrect statement regarding thermography
    a. thermography locates flaws by temperature variation on surface of a damaged part
    b. temperature gradients are measured by infrared camera or film
    c. temperature gradients are observed on oscilloscope *
    d. knowledge of thermal conductivity of part and reference standard is must for thermography

17. Laser Halography is adopted to detect
    a. disbonds b. water in honeycomb
    c. impact damage d. all above *

18. Laser holography is done by
    a. heating the part and photographed by special camera
    b. as in (a), with laser light source *
    c. passing the laser light through part and the defect is indicated on screen
    d. passing laser beam through the part and measure the temperature on surface

19. Radiography is used on composites to detect
    a. cracks which are not detected visually
    b. water in honey comb cores
    c. both of the above *
    d. none of the above

20. After a repair on composite is cured, hardness of the repair is tested by
    a. Brinells tester b. rockwell tester
    c. Barcol tester * d. any of the above

21. Barcol hardness tester can determine that
    a. resins have reached their proper strength *
    b. the fibre has reached its maximum strength
    c. both resins and fibres have reached to maximum strength
    d. whole composite have reached to desired strength

22. Dye penetrant method of crack detection is
    a. excessively used on composites
    b. most suitable on aramids
    c. still questionable to be used on composites *
    d. used to detect specific flaws

23. Mark the correct statement
    a. carbon/graphite components are easier to inspect
    b. ultrasonic and x-rays are not useful for aramid
    c. ultra sonic and x-rays are not useful for honey comb
    d. all above statements are correct *

24. Aircraft damages, most commonly occurs during
    a. landing and take off
    b. servicing, storage and maintenance
    c. during flying in air
    d. as said in (a) and (b) *

25. The structural integrity of composite part is weakened due to
    a. crack in fiber b. damage to resin *
    c. either of the above d. both of above

26. Aviation composites are designed to be
    a. hard, tough and cheap
    b. strong, light weight and durable *
    c. fail proof and damage tolerant
    d. as all above

27. Structural repairs are done to restore
    a. design strength b. remaining service life
    c. to original life d. (a) and (b) *

28. Traditional repair techniques of fiber glass, if used on advanced composite it may cause
    a. excessive weight
    b. increased susceptibility to fatigue
    c. decreasing flexibility d. all above problems *

29. To repair a composite surface
    a. it is cleaned with suitable soap and water
    b. after waterwash it is cleaned with acetone solution
    c. both above is done in sequence *
    d. it is cleaned with special chemicals

30. Mark the correct statement
    a. paint from composites is removed by using paint strippers
    b. paint is removed from the composites by power sanders
    c. paint strippers and power sanders are not used to remove paints *
    d. all above statements are wrong

31. To repair a composite
    a. paint is removed by hand sanding with #240 or finer
    b. outline the area of repair and mask off
    c. cut the layers with prescribed over lap stops on each layer
    d. all above is done in sequence *

32. If damage is occured to the core material, then
    a. first plies are cut then core material is removed
    b. core material is removed first with the help of routers
    c. damaged plies and core material are removed together
    d. removed core material partially first with router and then with flush bit the remaining one *

33. To accomplish the proper step cuts in laminates
    a. fiber and matrix is removed without damaging the down layer
    b. avoid damage to the surrounding area
    c. sanding is the proper method with most control
    d. all above is followed to cut the laminates *

34. The most adequate mechanical tool for sanding is
    a. small pneumatic right angle sander *
    b. a drill with a sanding disc attachment
    c. wheel grinder
    d. any of the above

35. To patch repair a composite
    a. each layer is sanded down one half inch around the damage
    b. layers are sanded in concentric circles with taper down to core
    c. the more accurately the sanding cuts, more easy to remove
    d. all above is correct *

36. Dust produced by sanding the composite material may cause
    a. skin irritations
    b. lungs irritation due to excessive breathing
    c. both above problems *
    d. none of the above problem

37. While step effect is accomplished by sanding
    a. aramid will fuzz initially
    b. carbon/graphite produces fine powder
    c. glossing indicate that one layer has been removed
    d. all above happens *

38. To know that one layer of fiber is removed
    a. glossing will appear
    b. look for change in major fiber direction
    c. measure the thickness of layer
    d. (a) and (b) are the only ways to know *

39. Scarfing is the method to remove damaged material
    a. with a tapered cut out *
    b. with a stepped cut out
    c. vertical cut out   d. by routers

40. After sanding
    a. dust is vacumm cleaned
    b. surface is solution cleaned by acetone or butyl alcohol
    c. solvant cleaning is with lint free cloth
    d. all above is done in sequence *

41. Mark the incorrect statement
    a. aramid requires longer drying time after solvant cleaning
    b. compressed air is used blow away the dust after sanding *
    c. to detect oil or greese contamination, water break test is done
    d. water break test is accomplished by flushing the surface with water

42. Moisture or water in composite structure can be detected by
    a. radiography   b. laser holography
    c. using an ohmmeter
    d. any of the above method *

43. Water can be removed from composite structure by
    a. vacumm bagging and heating with screen and bleeder
    b. by heating with heat lamps to evaporate the water
    c. removing the affected area and repaired
    d. any of the above method may be adapted as necessiated *

44. After repair, the repaired surface has to be protected from moisture by
    a. paint   b. end sealants
    c. layer of plastic Tedlar
    d. any of the above as recommended *

45. Manufacturer's repair manual is the only source of information to know about
    a. matrix, fiber and direction and number of plies
    b. ribbon direction of honey comb
    c. fiber orientation
    d. all above information *

46. Mark the correct statement
    a. the ribbon of the repair plug must be same as original part
    b. repair fiber orientation has to be as warp direction
    c. warp compass is used for reference of warp direction
    d. all above statements are correct *

47. For bonding patches and repairs, the fabric/resin mixture should be about
    a. 40   b. 50/50
    c. 60/40 *   d. 70/30

48. Many repairs requires the cure temperatures equal to manufacturing, in that case
    a. mix and lay the matrix on fibre at the time of repair
    b. use the pre-preg fibers *
    c. process adopted is same as manufacturing
    d. process adopted is like a ordinary fiber glass repair

49. During repairs if plastic backing is used then
    a. ensure that plastic is removed *
    b. make sure plastic is bonded with ply
    c. it should not disturb warp
    d. it will get melt and mix with by heat

50. The task of repair done
    a. regular basis as it does not depend upon the determination of the damage.
    b. routine basis.
    c. when it has been determined that the structure has been damaged to the extend that it requires a repair *.
    d. none of the above are correct.

51. The method of repair depend upon the
    a. type of defect, depth, size and location on the aircraft. *
    b. only the type of defect and size.
    c. only the type of defect and depth of the defect.
    d. only on the type and location of the A/C.

52. The classifications of the damage
    a. usually in five categories.
    b. usually in four categories.
    c. usually in three categories. *
    d. usually in two categories.

53. Negligible damage is a damage
    a. that may be corrected by a complex procedure with no restrictions on flight operation.
    b. that may be corrected by a simple procedure with restrictions on flight operation.
    c. all are correct.
    d. that may be corrected by a simple procedure with no restrictions on flight operation. *

54. The damage which is corrected by a simple procedure with no restrictions on flight operation is known as
    a. repairable damage
    b. negligible damage *
    c. non-repairable damage
    d. all are correct

55. Repairable damage is a damage
    a. to the skin, bond or core that can exist with placing restrictions on the aircraft.
    b. to the skin, bond or core that cannot exist without placing restrictions on the A/C or part. *
    c. to the skin, bond or core that can exist without placing restrictions on the A/C or parts.
    d. none of the above are correct.

56. When the damage occurs to the skin, bond or core that cannot exist without placing restrictions on the A/C or part known as
    a. repairable damage *
    b. non-repairable damage
    c. negligible damage
    d. all above are correct

57. A non-repairable damage is
    a. a damage that can be easily repairable.
    b. a damage that beyond established repair limit. *
    c. a damage that within the limit to be repair.
    d. none of the above.

58. The damage that is beyond the repair limits
    a. negligible damage
    b. repairable damage
    c. non-repairable damage *
    d. none of the above.

59. When the damage is beyond the repair limit
    a. that part must be replaced unless a structurally sound repair can be designed by a structural engineer. *
    b. simply that part must be replace.
    c. only the structurally sound repair can be designed by a structural engineer.
    d. none of the above

60. All permanent repairs must be
    a. structural, load carrying repairs that meet the aerodynamic smoothness requirement. *
    b. structural, load carrying repair that does not meet the aerodynamic smoothness requirement.
    c. load carrying repairs only.
    d. structural repairs only.

61. If a composite part has been damaged beyond the specified repairable limitation.
    a. it should removed and replace with the approval from the manufacture. *
    b. it should be repair
    c. it again designed by a structural engineer
    d. none of the above.

62. If some parts of the A/C in damage beyond the specified repairable limitation.
    a. that parts should only replace.
    b. that parts should replace with the approval from manufacturer.
    c. that parts should be crated and sent to the original manufacturer.
    d. b and c are correct. *

63. Standard repair procedures
    a. always follows the manufactuer's specified repair limits
    b. cannot always replace 100% of the full strength of the damage composite part.
    c. it is imperative that the manufacturer's specified repair limits not be exceeded by the use of ¥ fixed repairs.
    d. b and c are correct. *

64. Repair method and the classification of damage
    a. has been standardized in the Aviation industry.
    b. is classified by the each manufacturer with an appropriate repair procedure.
    c. has not been standardized in the Aviation industry*.
    d. a and c both are correct.

65. Scratehes are the type of
    a. negligible damage * b. repairable damage
    c. non-repairable damage d. none of the above.

66. A pents in skin that are stable and are not accompanied with delamination or broker fibre are classified as
    a. repairable damage
    b. negligible damage *
    c. non-repairable damage
    d. sometimes it is negligible and sometimes it is repairable.

67. Surface damage is defined as
    a. only by cuts and seratehes
    b. cuts, deep seraethes, abrasions and dents with broken fibres that do not penetrate the skin. *
    c. cuts and abrasions
    d. none of the above.

68. Panel edge damage occurs when the
    a. an dent damage less than 0.125 inch wide by 6.0 inches in length and less than depth of skin *.
    b. an dent damage greater than 0.125 inch wide by 6.0 inches in length and less than depth of skin.
    c. an dent damage less than 0.125 inch wide by 6.0 inches in length and greater than depth of skin.
    d. none of the above.

69. Surface damage and holes.
    a. lesser than hole limit but greater than 6.0 inches in diameter.
    b. greater than hole limit but go lesser than 6.0 inches in diameter. *
    c. lesser than hole limit but lesser than 5.0 inches in diameter.

d. none of the above.

70. There are .... type of defects.
a. 5 * b. 6
c. 3 d. 2.

71. Cosmetic defects is a defects
a. on the outer surfaces skin that does not involve damage of structural reinforcing fibres. *
b. struck by a foreign object.
c. that is a separation of layers of materials in a laminate.
d. in a advance composite structure.

72. The outer surface of skin that does not involve damage of structural reinforcing fibre is known as
a. hole damage b. impact damage
c. cosmetic defects * d. cracks.

73. The damage occur when struck by foreign objects is known as
a. cracks b. hole damage
c. impact damage * d. delamination.

74. The damage occur due to impact, moisture is the fabric or lightening strikes known as
a. delamination * b. cosmetic defects
c. impact damage d. cracks.

75. Which defect can be defected visually ?
a. cracks b. hole damage
c. delamination * d. cosmetic defects.

76. Hole damage occur
a. in advanced composite structure
b. due to lighting strike
c. from impact damage over torqueing fastness
d. b and c are correct. *

77. Areas on the A/C which are subjected to damage such as leading edges made of thin face sheets over a honeycomb panel should be inspected
a. depth inspection should be done at regular overhaul interval
b. visual inspection of these areas should be done periodically.
c. a and b both are correct *
d. none of the above.

78. Visual inspection is used to
a. detect internal flaws or areas suspected of delaminations.
b. detect cracks, surface irregularities and surface defects such as delamination and flistering. *
c. for internal damage
d. none of the above.

79. To detect internal flaws or areas suspected of delamination.
a. a visual inspection
b. a coin tap test is used *
c. a ultrasonic inspection
d. all are correct.

80. For internal damage inspection
a. a ultrasonic inspection have been done *
b. a coin tap test done
c. visual inspection done
d. all are correct.

81. In the Thermography
a. light is applied to the damage part
b. ultrasound is applied to the damage part
c. heat is applied to the damaged part *
d. none of the above.

82. When the damage parts is locate flaws by temperature variations at the surface is known
a. laser holography
b. ultrasonic inspection
c. thermography *
d. radio graphy.

83. To detect disbonds or water is honeycomb and impact damage we used
a. thermography
b. laser holography *
c. radio graphy
d. hardness testing.

84. The process where the suspect part to be heated and then photographed using a laser light source and special camera system known as
a. laser holography *
b. thermography
c. ultra sonic inspection
d. radio graphy

85. After repair has cured the
a. hardness testing has been done *
b. dye penetrant
c. radio graphy
d. all above are correct.

86. Dye penetrant has been used
a. for detecting cracks in metallic surfaces *
b. after a repair has cured
c. cracks in the surfaces
d. to detect the surface of a damaged parts.

87. Composite structure of A/C damage most commonly occurs during
a. the servicing of the A/C, storage, maintenance and during landing and takeoff.
b. only during landing and takeoff
c. during ground handling
d. a and c are correct. *

88. Aviation composites are designed to be
a. to be soft, heavyweight and durable
b. to be strong lightweight and durable *
c. to the strong, heavyweight and durable
d. none of the above.

89. The engine cowling is made of
a. composite of fibre glass, kevlar and carbon / graphite/fibre. *
b. only by composite fibre glass
c. only by carbon graphite
d. all are correct

90. The Engine cowlings typically use the
a. lower temp matrix material & to withstand the low operating temp around cowling.
b. higher temp matrix materials to withstand the high operating temp around cowling. *
c. lower temp matrix material to withstand the high operating temp around-cowling.
d. none of the above.

91. To determine the damage of the parts of A/C , first we have to
a. examine the visually for extent of damage *
b. examine the damage is repairable damage limit
c. check for delamination around the damage
d. all check has been done simultaneously.

92. While repairing composite materials the surface preparation include
a. remove surface contaminants. The paint must be removed from around the repair area and paint strippers should not be used. *
b. no need to touch surface contaminants. The paint must be removed and paint strippers should used on composite structure.
c. paint should removed and paint stripper should not used on composite structure.
d. all above are correct.

93. During the sanding process the technician must take care
a. to test a spacer or other Jig to maintain a specific sanding depth.
b. to remove only the required amount of material
c. a and b are correct *
d. none of the above.

94. If the damage has occurred to the core material of sandwich structure
a. To step cutting the laminate first and then after that damage core material must be removed.
b. firstly the damage core material must be removed then to step cutting the laminate. *
c. no need to cutting the laminate and only remove the damage core material .
d. none of the above.

95. While doing step cutting
a. the step effect is accomplished by sanding away approximately one-half inch of each layer. *
b. The step effect is accomplished by sanding away approximately one-fourth inch of each layer.
c. the step effect is accomplished by sanding away approx. twice inch of each layer.
d. none of the above.

96. Scurfing is used
a. to remove damage material with tapered, cut *
b. to remove damage material by sanding away
c. no need to damage material
d. none of the above.

97. Dimensions of the searf are based on the
a. ratio of the qinen length to the total height of the plies
b. ratio of the total height of the plies to a given length *
c. ratio of the given width to the plies to a given length
d. none of the above.

98. In composite repair science, which type of sanding operation is better that can be defined by
a. the technician
b. Aircraft Maintenance Engineer
c. follow the structural repair manual any questions directed to the manufacturer. *
d. all above are correct.

99. During the sanding operation the technician might touch the surface of the repair to see how the sanding is preceding.
a. it means by the touching the surface is cleaned so no need to clean the surface again
b. the oils from a persons hands will contaminates the surface and must be remove before bonding any patches. *
c. the oils from a persons hands will smooth the surface
d. none of the above.

■■■

CHAPTER - 99
TYPES OF REPAIRS

1. Repairs may fall in the category of
   a. bolted on metal or cured composite patches
   b. bonded on metal or cured composite patches
   c. resin injection or laminating
   d. any one of the above *

2. The bolted or bonded on surface patches are
   a. most perfered
   b. not preferred as can't restore the strength *
   c. able to restore original strength
   d. as (a) and (c)

3. A patch which is bolted or bonded on surface
   a. may cause areodynamic changes
   b. is useful for field repair
   c. may induce stress loads
   d. have their merits and demerits as above *

4. Resin injection repairs
   a. are used to fill holes or voids
   b. are used mostly on non structural parts
   c. does not restore much strength
   d. are as said above *

5. The most reliable type of repair is laminating on new plies, which involves
   a. removal of damaged plies
   b. laminating new plies of correct material
   c. both above actions *
   d. negligible efforts

6. Some of the most common reasons for a repair to fail are
   a. poor surface preparation
   b. contamination of materials
   c. improper mixing and curing
   d. all above *

7. Mechanically fastened repair with pre-cure patch are used
   a. for temporary repair *
   b. for permanent repair
   c. to restore original strength
   d. for aerodynamic parts

8. Most potted repairs are appropriate for
   a. foam core sandwich structure *
   b. carbon/graphite laminates
   c. fiber glass laminations
   d. all above composites

9. A common problem with the old fiber glass type of repair is that it calls to remove damaged area
   a. at vertical angle * b. by step sanding
   c. by scarfing d. by taper sanding

10. On some composites, minor de-laminations can be repaired by
    a. sanding and laminating
    b. resin injection repair *
    c. old fiber glass repair method
    d. any of the above method

11. Cosmetic damage on laminated structure is performed by
    a. sanding and apply resin with filler
    b. as in (a) and then cure
    c. as in (b), then sand to finish *
    d. just sanding and painting

12. Glider step cut repair is prescribed for glider repair to
    a. prevent delamination of surface plies *
    b. cracks on repair area
    c. prevent both above defects
    d. provide a attractive look

13. Mark the incorrect statement
    a. for thin laminate, fiber damage is repaired by step cut with backing plate
    b. A thick laminate is repaired by step cut in both directions
    c. A precured patch is attached inside for repairs, having only one side access, and repair plies built on it
    d. Edge repairs are done easily by injection repairs *

14. Edge repair is accomplished by
    a. scarf or step cut
    b. inserting repair plies longer then edge
    c. trimming the ply to size after curing
    d. all above in sequence *

15. Minor edge de-lamination can be repaired by
    a. scarfing
    b. step cut method
    c. resin injection and clamping *
    d. any of the above method

16. Sandwich structure pannels, skin to core voids can be repaired by
    a. resin injection
    b. filling the core with potting comound covered with laminates
    c. by traditional fiber glass method
    d. either of (a) and (b) depending upon the size of damage *

17. Most common problems associated with the repair of ribs are that
    a. ribs can be repaired temporarily
    b. flexing is excessive
    c. many manufactures do not approve the repair of rib
    d. mentioned in (a), (b) and (c) *

18. Usually a carbon/graphite rib is repaired with
    a. fiberglass *
    b. aramid
    c. ceramic
    d. any of the above

19. Crush damages on ribs are repaired by
    a. injecting resin and cover plies
    b. mixture of resin and milled fiber glass
    c. syntactic foam with cover plies *
    d. either of the above method

20. Mark the correct statement regarding loose or missing fastener
    a. standard aircraft procedure is used for replacement
    b. if hole is enlarged then next oversize fastener is used
    c. most fasteners are installed wet with some adhesive
    d. all above statements are correct *

21. Mark the incorrect statement
    a. during repair, if lightening protection is removed, is to be restored
    b. after repair, part is to be painted or gel coated
    c. all work is properly documented and quality control is excercised on the work
    d. all above statements are correct *

22. Repair of composite may be classified as
    a. bolted on metal
    b. As (a) bonded on metals
    c. As (b) resin injecton
    d. As (c) laminating on new repair plies. *

23. Resin injection in composite be useful for
    a. seam
    b. holes
    c. voids
    d. both b and c *

24. Resin injection type of repair is used in
    a. structural parts
    b. non structural parts *
    c. both a and b
    d. none of the above

25. The injected resin repair will
    a. restore very much strength
    b. not restore very much strength *
    c. strength is not considered
    d. stress is not considered

26. The most reliable type of repair is in composite
    a. bolted on metal
    b. bonded on metal
    c. resin injection
    d. laminating on new repair plies. *

27. Laminating repair describe as
    a. laminate the new plies on damaged area
    b. removing the damaged plies and laminating on new plies of the correct metal *
    c. both a and b are correct
    d. none of the above

28. What is / are most common reasons for failing of repair
    a. poor surface preparation
    b. contamination of fabric or other material used
    c. inadequate pressure
    d. all of the above *

29. Any repair is made to an aircraft which of the manual is recommended
    a. maintenance manual
    b. structural repair manual *
    c. overhaul manual
    d. composite manual

30. Which of the parameters are depended on repair of composite material
    a. volume and pressure
    b. temperature and pressure *
    c. volume and temperature
    d. temperature, volume and pressure

31. A patch that is bolted or bonded on above the surface of an external part will also have
    a. not aerodynamic change
    b. aerodynamic change *
    c. both a and b
    d. none of the above

32. Pre-cured patch used in composite for repair it gives
    a. minimum strength *
    b. maximum strength
    c. a and b
    d. none of the above

33. Pre-cured patch repair is a
    a. flush repair
    b. not flush repair *
    c. both a and b
    d. none of the above

34. Pre-cured patch considered as
    a. permanent repair
    b. temporary repair *
    c. permanent and temporary
    d. none of the above

35. Pre-cured patches method repair are performed with common repair materials such as
    a. sheet metal plates
    b. Rivets
    c. both a and b *
    d. none of the above

36. Pre-cured repair patches considered as
    a. permanent repair
    b. temporary repair *
    c. some cases it may be permanent repair
    d. all of the above

37. Potled repair gives
    a. more strength
    b. less strength *
    c. a and b
    d. none of the above

38. Procedure for many structural repair manuals are still listing this type of repair for advanced composite structures
    i. clean the damaged area.
    ii. sand out the delamination area
    iii. fill the core area with a resin
    iv. prepare batches
    v. apply pressure and cure
    vi. refinish
    a. One b. Three
    c. Four d. Six *

39. Most potted repairs are appropriate for
    a. all structures
    b. foam core sandwich structures *
    c. both a and b
    d. all of the above

40. A common problem with the old fibre glass repair is that it calls for
    a. damaged core to be routed at a horizontal angle
    b. damaged core to be routed at a vertical angle. *
    c. damaged core to be routed at a lateral angle.
    d. all of the above.

41. Composite repair is applicable to
    a. structural parts b. non structural parts
    c. both a and b * d. none of the above

42. what is the difference between composite repair and fibre glass repair
    a. plug is retained in the routed hole is in the way the repair plug is retained in the route hole in the core *
    b. type of reinforcement material used.
    c. type of core
    d. all of the above

43. In composite repair using overlap patch
    a. increasing strength *
    b. decreasing strength
    c. both a and b
    d. none of the above

44. Clean out crushed core and undercut core approximately
    a. .120" b. .125" *
    c. .130" d. .135"

45. Delamination means
    a. laminate layers becoming separated. *
    b. laminate layers becoming joined.
    c. laminate layers becoming joined.
    d. all of the above.

46. Delamination detected by
    a. visual inspection
    b. by shining a light over the part and looking at the damaged area at an angle.
    c. both a and b *
    d. none of the above

47. In injection repair process which is used for cleaning
    a. acetone b. MEK
    c. both a and b * d. none of the above

48. For repairing delamination parts drilling can be done
    a. through the part
    b. No drill through the part *
    c. ½" to the hole length
    d. 1" to the hole dia.

49. Drill at least dia of the structure for repair
    a. .05" b. .03"
    c. .06" * d. .08"

50. The potting compound is installed in composite structure. The drilling hole should be
    a. more than $^1/_8$"
    b. less than $^1/_8$"
    c. at least $^1/_8$" *
    d. any size of drill is recommendate

51. What do you mean by cosmetic defect
    a. it is a surface resin scratch that does not penetrate the first structural ply. *
    b. it is a surface resin scratch that penetrate the first structural ply.
    c. it is a surface resin scratch that penetrate the all layer of ply.
    d. none of the above.

52. The replacement ply is cured with
    a. heat b. pressure
    c. both a and b * d. none of the above

53. An overlap patch usually
    a. one inch larger than the last repair.*
    b. one inch less than the last repair.
    c. both a and b
    d. none of the above

54. The overlap patch will initially sit on
    a. top * b. bottom
    c. middle d. all of the above

55. The replacement plies are cured with heat and pressure for
    a. restoring strength * b. decreasing strength
    c. both a and b d. none of the above

56. Which of the following are used for repair
    a. glider step cut repair
    b. damage removal and replacement
    c. injection repair
    d. all of the above *

57. What is the purpose of using glider step cut type of repair is
    a. prevent surface plies *
    b. prevent middle plies
    c. both a and b
    d. none of the above

58. High impact damage repaired by
    a. damaged removal and replacement.
    b. injection repair
    c. glider stepcut repair *
    d. all of the above

59. If the air is present in the lamination
    a. we may use the composite
    b. we may not use composite
    c. the composite is not airworthy *
    d. all of the above

60. Damages which affects all of the laminate layers of a structure can be addressed in several ways depending on
    a. the numbers of plies in the part.
    b. the location of the damage, e.g.. leading edge or wheel well door.
    c. the size of the damage
    d. all of the above *

61. Edge delamination can sometimes be repaired by
    a. injecting resin into the delamination.
    b. clamping the edge
    c. allowing the resin to cure
    d. all of the above *

62. Edges are usually damaged by either being crushed or punctured. Regarding the above statement which choice is true
    a. this type of damage is removed using the specified scarf or stepcuts.
    b. new plies are inserted along with and overlap the patch on both the top and bottom of the part
    c. the repair plies are left longer than the edge of the existing structure then cured.
    d. all of the above $ once part has been cured the edge can be trimmed to the correct length and shape. *

63. Regarding repair of sandwich structures which statement is true.
    a. punctures to one side that damages the face sheet.
    b. core may be repaired a number of ways.
    c. depending on size, extent of damage.
    d. all of the above. *

64. What are the common method for repair sandwich structures
    a. delamination at the core - skin to core voids.
    b. small punctures through skin and into sandwich structure.
    c. both a and b *
    d. none of the above

65. A more extensive way to repair a skin to core delamination is to cut out the delamination and
    a. to cut out the delaminated skin.
    b. scarf back the laminate skin.
    c. then fill the core area with a potting compound.
    d. all of the above. *

66. The repair of composite material recommended by
    a. mechanics
    b. recommended by the person who repaired.
    c. manufacturer *
    c. none of the above.

67. Rib is made of
    a. cellulose acetate foam and core.
    b. carbon / graphite laminate skin
    c. both a and b *
    d. none of the above.

68. The fibre glass is used in repair because
    a. takes so much stress
    b. where it is reinforced
    c. both a and b *
    d. none of the above

69. What is the cause use of fibre glass instead of the carbon / graphite
    a. stress * b. strain
    c. both a and b d. none of the above

70. Mark the correct statement
    a. lightning hits an a/c it needs a path for the electricity to flow through *
    b. in composite does not require path for the electricity to flow through during lightning.
    c. aluminium is not conduct electricity.
    d. in a/c static path does not require.

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CHAPTER - 100
REPAIR OF COMPOSITE STRUCTURES

1. Selection of repair scheme is as follow
   a. identification of damage
   b. damage evaluation
   c. damage classification
   d. all above *

2. When damage is negligible, repair is of
   a. cosmetic in nature *
   b. tantamount in nature
   c. none-cosmetic in nature
   d. non tantamount in nature

3. Important factor for repair considerations for repair durability is
   a. fatigue loading * b. load path variation
   c. size of the repair d. all above .

4. Factor/factors affecting repair requirement is/are for repair durability
   a. corrosion
   b. fatigue loading
   c. environmental degradation
   d. all above *

5. Repair considerations for aerodynamic smoothness, the important factor is
   a. performance technique *
   b. size of the repair
   c. mass balance effect
   d. all above.

6. Important factor which is considered for related on-board air craft systems is
   a. fuel system sealing * b. types of exposure
   c. load path variation d. all.

7. Important factors required for stiffness is/are
   a. deflection limitations
   b. load path variations
   c. flutter and other aeroelastic effects
   d. all above *

8. Laminates made up of graphite/epoxy absorbs about
   a. 2% of moisture * b. 20% of moisture
   c. 40% of moisture d. 60% of moisture.

9. Paint may be removed by
   a. hand sanding b. wheat starch blasting
   c. plastic media blasting d. all above *

10. Cosmetic repair
    a. does not regain any strength
    b. is used only where strength is unimportant
    c. is used only where strength is important
    d. both (a) and (b). *

11. Resin injection repair is a
    a. non-structural filler b. semi-structural repair *
    c. repair of thick laminate d. all.

12. Resin injection is
    a. quick b. cheap
    c. semi-structural repair d. all above *

13. Plug repair is
    a. a semi-structural repair *
    b. a non-structural filler
    c. a complex repair
    d. none.

14. Bolted repairs are employed for
    a. field repair of thick laminates
    b. complexity of repair
    c. excessive shear stress requirement
    d. all above *

15. Following failure modes are required to be considered before carrying out any external bolted repair
    a. net tenssion in repaired hole
    b. fastener shear failure
    c. laminate bearing interaction
    d. all above *

16. As a general rule, the distance between the fasteners may be kept a minimum of
    a. four diameter of hole *
    b. five diameter of hole
    c. six diameter of hole
    d. seven diameter of hole.

17. External bonded repair is employed to repair laminate and skins of honey comb panels having thickness upto
    a. 2 mm * b. 4 mm
    c. 6 mm d. 8 mm.

18. Strength recovery for external bonded repair is up to
    a. 10 to 20% of ultimate allowable of the parent material
    b. 20 to 40% of ultimate allowable of the parent material *
    c. 40 to 60% of ultimate allowable of the parent material
    d. 70 to 100% of ultimate allowable of the parent material.

19. Flush stepped and scarf repair has inherent advantage of
    a. ensuring uniform shear stress distribution *
    b. ensuring uniform tensile stress distribution
    c. ensuring uniform compressive stress distribution
    d. ensuring uniform bending stress distribution.

20. In flush stepped and scarf repair, a minimum allowance of about
   a. 1 to 2 mm over lap is required
   b. 2 to 3 mm over lap is required
   c. 3 to 4 mm over lap is required
   d. 5 to 10 mm over lap is required *

21. Advantage of bonded repair is
   a. bonding minimise corrosion *
   b. easy to inspect for quality
   c. easily disassembled
   d. all.

22. Advantage of bolted joint is
   a. easily disassembled * b. minimizes corrosion
   c. smooth surface finish d. all.

23. Disadvantage of bonded repair
   a. bonding increases corrosion
   b. point stress concentration
   c. rough surface finish
   d. none *

24. Disadvantage of bonded repair
   a. difficult to disassemble *
   b. rough surface finish
   c. maximize corrosion
   d. all.

25. Bolted repair, generally which patches are required
   a aluminium b. zinc
   c. titanium * d. lead.

26. In bonded repair is ideal for flat surfaces where damage is restricted to
   a. 50 - 75 mm * b. 100 - 125 mm
   c. 125 - 175 mm d. none.

27. Typical scarf distances are from
   a. 20 to 120 times the thickness of the laminate being scarfed *
   b. 120 to 240 times the thickness of the laminate being scarfed
   c. 240 to 260 times the thickness of the laminate being scarfed
   d. 260 to 300 times the thickness of the laminate being scarfed.

28. Many adhesive and all prepregs used for repair require
   a. -18°C storage temperature *
   b. 0°C storage temperature
   c. 10°C storage temperature
   d. 15° C storage temperature.

29. Monolithic skins repair procedure for composite is
   a. repair of minor surface fibre separation *
   b. repair of major surface fibre separation
   c. repair of core damage
   d. all above .

30. Honey comb sandwich structure repair procedure for composite involves
   a. repair of core damage
   b. wet lay-up external skin patch
   c. repair of thin face sheets
   d. all above *

31. Cosmetic repair comes under
   a. monolithic skins *
   b. honey comb sandwich structure
   c. repair of sub-structure
   d. all.

32. In repair of honey comb sandwich, area to be dried is enclosed in a
   a. steel vaccum bag b. nylon vaccum bag *
   c. wax vaccum bag d. none.

33. The part to be dried in vacuum bag is held in vaccum bag for
   a. 24 hours b. 48 hours *
   c. 60 hours d. 72 hours.

34. Curing is done by heating to a temperature of
   a. 93° - 110°C * b. 110° - 130°C
   c. 130°- 140°C d. 140° - 160°C.

35. Curing temperature is raised at a rate of __________per minut
   a. 0.8° to 4.1°C * b. 5° to 10°C
   c. 10° to 15°C d. none.

36. In curing process when heating temperature is 200°F, the heating temperature is raised at the rate of
   a. 0.8°C / m * b. 8°C / m
   c. 10°C / m d. 12°C / m.

37. In curing process, vaccum is of
   a. 560 mm of Hg * b. 600 mm of Hg
   c. 700 mm of Hg d. 750 mm of Hg.

38. In curing process, cool down at a rate of
   a. 2.5°C / m * b. 5°C / m
   c. 7.5°C / m d. 10°C / m.

39. For 200 mm diameter circular repair, will require at least a
   a. 30 mm diameter heat blanket
   b. 100 mm diameter heat blanket
   c. 200 mm diameter heat blanket
   d. 300 mm diameter heat blanket *

40. Heating blanket used in conjunction with vacuum pressure repairs should have an output of no less than
   a. 700 w/m^2 b. 750 w/m^2
   c. 1000 w/m^2 d. 7750 w/m^2 *

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CHAPTER - 101
ENVIRONMENTAL EFFECTS ON COMPOSITES

1. Composite usage has increased enormously because of its
   a. light weight * b. heavy weight
   c. cheap cost d. none of the above

2. Composite materials have following advantages
   a. specific strength b. specific stiffness
   c. dimensional stability d. all of the above *

3. Biological attack on composite materials may consist
   a. fungal growth b. marine fouling
   c. both a and b * d. neither a nor b

4. What has been mixed with resins to retard fungal growth
   a. fungicide * b. luicide
   c. martensite d. all of the above

5. Marine organisms grows on
   a. composite surfaces *
   b. composite inner layers
   c. center part of composites
   d. none of the above

6. Fouling can be removed by
   a. lapping b. casting
   c. scraping * d. honing

7. Composite with graphite fibres have been used in
   a. in pressure vessels
   b. medical applications *
   c. agricultural applications
   d. none of the above

8. External composite designs such as artificial limbs or orthotic braces may experience
   a. wet corrosion b. season cracking
   c. crack damage d. impact damage *

9. Fatigue occurs due to
   a. mechanical loads b. acoustics vibrations
   c. both a and b * d. neither a nor b

10. Fatigue can cause
    a. crack growth
    b. local defect formation
    c. both a and b *
    d. neither a nor b

11. Below which temperature the stiffness of some composite may increase
    a. below 20^0 C b. below 50^0 C *
    c. below 100^0 C d. below 207^0 C

12. Water acts as a-----------------when absorbed by the matrix
    a. elasticises b. corrosion excitor
    c. both a and b d. plasticiser *

13. When moisture migrate along with the fibre matrix interface affects the
    a. adhesion *
    b. cohesion
    c. bonding b/w two crystals
    d. none of the above

14. Moisture in composites reduces
    a. transverse strength b. fracture toughness
    c. impact resistance d. all of the above *

15. Lowering of the glass transition temperature may also occur in epoxy and polymide resins with an increase in
    a. absorbed moisture * b. moisture
    c. neither a nor b d. discharge moisture

16. Debonding can occur due to formation of discontinuous
    a. bubbles b. blows
    c. cracks d. none of the above *

17. Moisture is absorbed into the composite untie a
    a. saturation point is reached *
    b. saturation point is not reached
    c. in both a & b
    d. equilibrium condition is reached

18. When glass transition temperature decreases, the diffusion process
    a. changes * b. does not changes
    c. sometimes changes d. none of the above

19. Strength reductions in Polyster laminates have been found to be _____________ while epoxy resins are less vulnerable
    a. 20 to 25 % b. 10 to 15 % *
    c. 30 to 35 % d. 40 to 45 %

20. Fibre glass composites are extensively used in
    a. agricultural application
    b. non marine structural application
    c. marine structural application *
    d. none of the above

21. Why the fibre glass composites are used in marine structural applications
    a. due to its easy availability
    b. due to resistance to the marine environment
    c. due to its strength to weight ratio
    d. both c & b statement are right *

22. Glass reinforcement is preferred over carbon fibres due to
    a. its cheapness
    b. carbon's electrical conductivity *
    c. thermal conductivity
    d. none of the above

23. Air craft fluid environment consists of
    a. fuel and hydraulic fluid
    b. lubricants
    c. deicing compounds and water
    d. all of the above *

24. The fuel water immersion appeared to be the most damaging reducing the tensile strength of graphite by
    a. 24% b. 11% *
    c. 22% d. 27%

25. The fuel water immersion appeared to be the most damaging, reducing the tensile strength by
    a. 27% b. 75%
    c. 50% d. 25% *

26. The automotive fluid environment consists of
    a. Gasoline b. oil
    c. both a & b * d. neither a & b

27. Transmission fluid and coolant are the part of
    a. railway environment
    b. agricultural environment
    c. automotive fluid environment *
    d. none of above

28. Most of the composites in a moist high temperature (150^{o} C) environment exhibited
    a. crater cracking b. season cracking
    c. micro cracking * d. macro cracking

29. The amount of moisture absorbed, as measured by weight gain, is directly related to the
    a. change in mechanical properties *
    b. change in electrical properties
    c. change in thermal properties
    d. none of the above

30. Paint strippers contains
    a. acetylene b. methylene *
    c. benzene d. none of the above

31. .... may affect the performance of composites.
    a. warm climate b. moist climate
    c. both a & b * d. neither a nor b

32. How much decrement is noted in tensile strength for fibre glass / polyster due to extended weathering
    a. 30 to 40% b. 10 to 20% *
    c. 20 to 30% d. none of the above

33. Effect of weathering on composites depends on the
    a. type of season b. type of material *
    c. type of loads d. none of the above

34. Where the paint was intact, the material retained ________of its original strength
    a. 60% b. 70%
    c. 90% * d. 50%

35. When the paint had been eroded away, the composite retained only_________ of its original strength
    a. 55% b. 68% *
    c. 70% d. none of the above

36. Static tests are carried out by immersion of composite parts in fluids like
    a. fuel b. hydraulic fluids
    c. water d. both a & b *

37. Dimensional swelling of the resin matrix generally results from exposure
    a. to high humidity at low temperature.
    b. to high humidity at high temperature.
    c. exposure to many aircrafts fluid
    d. both b & c statement are right *

38. Absorbed moisture lowers the glass transition temperature of a
    a. laminate * b. matrix
    c. substance d. none of the above

39. Hail strike to composite structures leads to
    a. corrosion damage b. crack damage
    c. impact damage * d. none of the above

40. For hail strike purpose, composite structure having a skin thickness of 0.8 mm is protected at design stage to with stand
    a. 2 inch hail stone on the ground *
    b. 3 inch hail stone on the ground
    c. 4 inch hail stone on the ground
    d. none of the above

41. The impact resistant of composite materials can be controlled by the choice of
    a. reinforcement b. matrix
    c. both a & b * d. none of the above

42. Microcracking results in
    a. reduction of compressive and shear strength. *
    b. reduction in tensile strength
    c. reduction in corrosion
    d. none of the above

43. Protection against temperature effects can be achieved at the design stage by
    a. selection of resin system with high glass transition temperature.
    b. potential degradation taken into account in the analysis and fatigue test.
    c. protection against moisture exposure
    d. all of the above *

44. Heat generated by lightening strikes has been known to
 a. epoxy resin b. polyster resin
 c. vaporised matrix resin* d. none of the above

45. Vaporise matrix resin create large areas of delamination and __________ on composite rudders.
 a. season cracking b. fibre fracturing *
 c. crater fracturing d. none of the above

46. Which kind of methods may consist of application of heat resistant ablative coatings
 a. pevelar b. rectric
 c. scheduled d. preventive *

47. Ultraviolet radiation is a band of light from
 a. 700 to 1200 A^0 b. 300 to 4000 A^0 *
 c. 4000 to 4800 A^0 d. 2600 to 3000 A^0

48. Ultraviolet radiation may cause
 a. degradation through molecular weight. *
 b. degradation through crystal weight.
 c. both a & b are right.
 d. neither a nor b

49. ________ used to prevent ultraviolet damage
 a. standard marine paints b. pigmented gel coatings
 c. neither a nor b d. both a & b *

50. Coatings have been used to protect
 a. composite materials from degradation. *
 b. cracking
 c. rusting
 d. none of the above

51. Biological attack on composite materials may consist of
 a. Fungal growth
 b. Fungal growth and marine fouling *
 c. Fungal growth and moisture
 d. Moisture and marine fouling

52. Fatigue causes
 a. Crack growth b. Local defect formation
 c. a & b * d. None

53. Fatigue design depends on
 a. Load b. Temperature
 c. Moisture d. All above*

54. Water when absorbed by the matrix , it acts as
 a. Plasticiser * b. Brittleness inducer
 c. Ductility inducer d. All

55. Moisture in the composites reduce
 a. Transverse strength b. Fracture toughness
 c. Impact resistance d. All above *

56. Moisture is absorbed into the composite until a
 a. Saturation point is reached *
 b. Sublimation point is reached
 c. Triple point is reached
 d. All above happens

57. Meaning of a non-Fickian process is
 a. Rate of relaxation in the material due to water absorption *
 b. Rate of relaxation in the material due to oxygen
 c. Rate of relaxation in the material due to NH_3
 d. None of the above

58. When epoxy resins are less vulnerable , strength reduction in polyester laminates has been found to be
 a. 5-10% b. 10-15% *
 c. 15-20% d. 20-25%

59. A galvanic cell is formed due to
 a. Presence of moisture b. Presence of electrolyte
 c. Both a & b * d. None

60. Aircraft fluids consists of
 a. Fuel b. Lubricants
 c. Water d. All *

61. The fuel water immersion reduces the tensile strength of graphite / epoxy by
 a. 5% b. 11% *
 c. 16% d. 25%

62. The fuel water immersion reducing the tensile strength of kevlar composites by
 a. 5% b. 10%
 c. 15% d. 25% *

63. Automotive fluids environment consists of
 a. Battery acid * b. Water
 c. De-icing compounds d. All

64. When the paint had been eroded away , the composite retains only
 a. 68% of its original strength *
 b. 78% of its original strength
 c. 88% of its original strength
 d. 98% of its original strength

65. Protection against temperature effects can be achieved by
 a. Selection of resin system with high glass transition temperature
 b. Protection against moisture exposure
 c. Fatigue test
 d. All above means*

66. Ultravoilet radiation is a band of light from
 a. 100 to 200Å b. 1000 to 2000Å
 c. 300 to 4000Å * d. 500 to 50000Å.

67. Ultravoilet radiation may cause
 a. degradation through molecular weight change
 b. degradation through cross linking in the resin system
 c. Both a & b * d. None

68. Degradation can be controlled by
 a. Thermal control tape * b. Volume control tape
 c. Pressure control tape d. All above.

■■■

CHAPTER - 102
AIRCRAFT LIGHTENING PROTECTION

1. Lightening is a
   a. High voltage and low current phenomenon.
   b. High voltage and high current phenomenon *
   c. Low voltage and low current phenomenon.
   d. Low voltage and high current phenomenon.

2. The most common producer of lightening is
   a. Cumulonimbus thunder clouds *
   b. Electric arc
   c. Thermal arc
   d. All

3. Series of successive lightening attachment points along the sweeping path are called
   a. Dwell point * b. Drop point
   c. Rise point d. None

4. The amount of damage produced at dwell point by a swept stroke depends on the
   a. Type of material b. Dwell point
   c. Lightening current d. All above *

5. Zone 1A is
   a. First return stroke zone *
   b. First return stroke zone with long hang on
   c. Transition zone for first return stroke
   d. None

6. Zone 1B is
   a. First return stroke zone
   b. First return stroke zone with long hang on *
   c. Swept zone
   d. Transition zone

7. Zone 1 C is
   a. Transition zone for first return stroke *
   b. Swept stroke zone with long hang on
   c. First return stroke zone with long hang on
   d. Swept stroke zone

8. Zone 2A is
   a. First return stroke zone b.Swept stroke zone *
   c. Transition zone d. All

9. Zone 2B is
   a. First return stroke zone
   b. Transition zone for first return stroke
   c. Swept stroke zone
   d. Swept stroke zone with long hang on *

10. Zone 2A is
    a. First return stroke zone
    b. First return stoke zone with long hang - on
    c. Transition zone
    d. None of the above*

11. Zone 3 is
    a. Zone 1A b. Zone 1B
    c. Zone 2A d. None *

12. The locations of zones are dependent on
    a. Air craft geometry b. Material
    c. Operational factors d. All above *

13. Forward extremities should be in zone
    a. 1A * b. 1B
    c. 1C d. None

14. Trailing edges should be in zone
    a. 1A b. 1B *
    c. 1C d. 2A

15. Leading edges should be in zone
    a. 1A * b. 1B
    c. 1C d. 2B

16. Extreme aft location of zone 1A depends on aircraft operating speed i.e. :
    a. 3000 m / per minut* b. 4000 m / per minut
    c. 5000 m / per minut d. 6000 m / per minut

17. Depending on the operating speed ,a total leader sweep distance is of
    a. 1.6m b. 2.6 m *
    c. 3.6 m d. 4.6 m

18. Propeller are usually considered in zone
    a. 1A * b. 1B
    c. 1C d. 3

19. Nacelle and other aircraft surfaces with a 45° projection aft of the propeller blade tips may be considered in zone
    a. 1A b. 2A
    c. 1C d. 3 *

20. Direct effects of lightening are caused by
    a. The attachment of the lightning arc
    b. The passage of lightning current through the structure
    c. Both a & b *
    d. None

21. Indirect effects are caused by the
    a. Electromagnetic fields of lightening *
    b. Electric fields of lightening
    c. Chemical fields of lightening
    d. All

22. Indirect effects of lightning includes
a. Temporary upset b. Malfunction
c. Permanent damage d. All above*

23. For wind shields we use, as lightening protection,
a. Polycarbonates b. Acrylics
c. Glass d. All above *

24. Lightening produces damage to a non conducting skin by
a. Puncture b. Surface flashover
c. Both a & b * d. None

25. The surface conductivity of the composite materials used in fairings is
a. 10 to 20 ohms per square / m
b. 10^{10} to 20^{11} ohms per square / m
c. 20^{10} to 20^{11} ohms per square / m
d. 10^{12} to 20^{14} ohms per square / m *

26. The surface conductivity of the composites used in radomes in ohms per square / m is
a. 10^2 b. 10^4
c. 10^6 * d. 10^8

27. The surface conductivity of the composites is sufficient to yield relaxation times of
a. 10-100 milli seconds * b. 10-100 sec
c. 10-1000 sec d. 100-1000 sec

28. Dielectric constant and electric field in the skin are
a. Higher & lower than air respectively *
b. Higher & higher than air respectively
c. Lower & lower than air respectively
d. Lower & higher than air respectively

29. A measure of ability of a non conductive material to resist puncture is, its
a. Electric strength b. Dielectric strength *
c. Both a & b d. None

30. Polycarbonate resins are usually found in
a. Only zone 1 location
b. Zone 3 location
c. Zone 1 & zone 2 location *
d. Zone 1 & zone 3 location

31. Solid diverters used in zone 1A are designed to conduct current in the order of
a. 200A b. 200KA *
c. 400A d. 400KA

32. Solid diverters used on a nose radome are designed to action, integral of the order of
a. $2 \times 10^1 A^2 S$ b. $2 \times 10^3 A^2 S$
c. $2 \times 10^6 A^2 S$ * d. $2 \times 10^8 A^2 S$

33. Mostly diverters have cross - sectional area of about
a. $0.2cm^2$ b. $0.3cm^2$
c. $0.4cm^2$ d. $0.5cm^2$ *

34. The diverters should be oriented in
a. Fore direction b. Aft direction
c. Both a & b * d. None

35. Typical spacing range for diverters is
a. 5 to 10 cm b. 10 to 20 cm
c. 30 to 35 cm d. 30 to 60 cm *

36. Thickness of the method coating range, for arc sprayed metals, range from
a. 0.001 to 0.002mm b. 0.01 to 0.02mm *
c. 0.1 to 0.2 mm d. 1 to 2 mm

37. Most commonly used metal for flame sprayed metal is
a. Al * b. Fe
c. C d. Zn

38. The metal fabrics most commonly used are woven of aluminium wires which are spaced
a. 10 to 20 per cm b. 20 to 30 per cm
c. 30 to 40 per cm d. 40 to 80 per cm *

39. In woven wire fabrics , wire diameter ranges from
a. 0.005 to 0.001mm b. 0.05 to 0.1 mm *
c. 0.5 to 5mm d. 0.1mm to 10 mm

40. Disadvantage of woven wire fabrics is
a. Difficulty of laying over compound surfaces *
b. Non flexibility
c. Heavy weight
d. All

41. For lightening protection , solid metal foil should have minimum thickness of
a. 0.00025 mm b. 0.00002 mm
c. 0.025 mm * d. 0100001 mm

42. Conductivity and protection effectiveness of expanded metal foil are
a. Better than metal fabrics *
b. Poor than metal fabrics
c. Much poor than metal fabrics respectively
d. None

43. The thickness of expanded metal foil is between
a. 0.00005 to 0.0001 mm
b. 0.0005 to 0.001 mm
c. 0.005 to 0.01 mm
d. 0.05 to 0.1 mm *

44. Most solid carbon fibre composite laminates employed as aircraft skins have thickness ranging from
a. 0.5 to 5 mm * b. 0.1 to 1 mm
c. 0.2 to 2 mm d. 0.3 to 3 mm

45. Carbon fibre composite skins that need lightening protection are
a. Fuselage pressure hulls b. Engine nacelles
c. Flight control surfaces d. All above surfaces*

46. Carbon fibre composites skins that do not require lightning protection is
   a. tail cones *
   b. Fuselage pressure hulls
   c. Flight control surfaces
   d. All

47. In inter woven wires, for lightening protection, the wires have diameter of
   a. 0.00008 to 0.00012 mm
   b. 0.0008 to 0.0012 mm
   c. 0.008 to 0.012 mm
   d. 0.08 to 0.12 mm *

48. In inter woven wires , the arrangements have
   a. 1 to 2 wires per cm of cloth
   b. 2 to 5 wires per cm of cloth
   c. 3 to 9 wires per cm of cloth *
   d. 4 to 1 2 wires per cm of cloth

49. Specific ways to provide electrical conductivity across adhesive joints is / are
   a. Doping of adhesive with electrically conductive particles *
   b. Insertion of a convective screen in to the bond
   c. Insertion of a convective screen in to the adhesive
   d. None

50. Feature of lightening strike protection to tail plane includes
   a. Aluminium trailing edge
   b. Conductive straps in the tip
   c. Conductive straps in the fittings
   d. All above features*

51. For direct current testing , four lightning current components are
   a. S,T,U,V   b. A,B,D,E
   c. A,B,C,D *   d. E,F,G,H

52. For indirect effect testing , one current component is
   a. B   b. C
   c. D   d. E *

53. For indirect effect testing , how many current component is / are
   a one *   b. Two
   c. Three   d. Four

54. Component E, for indirect effect testing wave form is derived from
   a. Clouds to ground lightening discharge
   b. Intracloud discharge
   c. Cloud -to -cloud discharge
   d. Both a & b *

55. For direct effect testing .A current component has time of
   a. $-\leq 500\,\mu s$ *   b. $-\leq 5 \times 10^{-1}$ sec
   c. $-0.025\ s \leq T \leq 1s$ d. None

56. For direct effect testing , C current component has charge transfer of
   a. -10 coulombs
   b. -200 coulombs $\pm$ 20% *
   c. -100 coulombs
   d. None

57. Average amplitude for component B for direct effect testing is
   a. -2KA $\pm$ 10% *   b. -2KA $\pm$ 20%
   c. -2KA $\pm$ 30 %   d. -2KA $\pm$ 40%

58. Time for component C for direct effect testing is
   a. $-0.25\ S \leq T \leq 1S$ *   b. $-\leq 500\,\mu s$
   c. $-\leq 200\,\mu s$ d. $-\leq 100\,\mu s$

59. Action integral for component D for direct effect testing is
   a. $-0.25 \times 10^6 A^2S \pm 20\,\%$ *
   b. $-0.25 \times 10^2 A^2 S \pm 10\%$
   c. $-0.25 \times 10^1 A^2 S \pm 5\%$
   d. None

60. Amplitude for component C for direct effect testing is
   a. 100A   b. 40 A
   c. 10 A`   d. None *

61. Lightening is
   a. high voltage phenomenon
   b. high current phenomenon
   c. both a & b *
   d. none of the above.

62. The most common producer of light is
   a. clouds over erupting voleanos
   b. sandstroms
   c. snowstorme
   d. cumulonimbus thunder *

63. Cloud-to-ground lightning are involving
   a. between two cloud
   b. between cloud and ground *
   c. cloud and aircraft
   d. aircraft and ground.

64. Intra cloud lightning are involving
   a. between two cloud
   b. between charge centrer *
   c. between cloud and ground
   d. none of the above.

65. The stepped leader are
   a. the total flash initiated by a clawnward travelling spark
   b. the total flash initiated by as upward travelling spark
   c. either a or b. *
   d. none of the above.

66. The visible flash occurs when
    a. stepped leader contacts ground
    b. stepped leader contacts oppsitively charged body
    c. either a or b *
    d. none of the above.

67. The lightening will appear to thicker if
    a. the time period between stroke is larger *
    b. the time period between stroke is small
    c. either a or b
    d. none of the above.

68. Which of the following has higher amplitude
    a. downward travelling leader
    b. upward travelling leader
    c. return stroke *
    d. direct stroke.

69. Entry stopts on a flight are
    a. forward or upper location. *
    b. abt location
    c. either a or b
    d. none of the above.

70. Intracloud flash occurs above
    a. 2000 m b. 3000 m *
    c. 4000 m d. none

71. Strikes below .... results cloud to ground flash.
    a. 2000 m b. 3000 m *
    c. 4000 m d. none

72. The frequency of occurance of clowd is less at an attitude
    a. >3000 m b. >6000 m *
    c. <3000 m d. <6000 m

73. The direction of electrostatic force is lightening (kv/m) is maximum at the region, where
    a. equipotential surface are closer *
    b. equipotential surface are farther
    c. either a or b
    d. none of the above

74. When a forward entreamity is an initial attachement point, the movement of aircraft through the lightning channel causes the channel sweep back over the surface producing subsequent attachement points. Such is called as
    a. single stroke phenomenon
    b. contineous stroke phenomenon
    c. sweep stroke phenomenon *
    d. double stroke phenomenon.

75. A series of successive lighting attachement points along the sweep path called as
    a. dual point b. sweep point
    c. dwell point * d. none of the above.

76. All forward extreamities or leading edges should be in
    a. Zone IA * b. Zone IB
    c. Zone 2B d. Zone 3B

77. All extreamities that are trailing edges should be in
    a. Zone IA b. Zone IB *
    c. Zone 2B d. Zone 2A.

78. The portion of the aircraft that lie beneath or between the other Zones and/or conduct substantial amount of electrical corrent between direct or swept attachment point is included as
    a. Zone 1 b. Zone 2
    c. Zone 3 * d. none

79. Corona/streamer test is
    a. high voltage test *
    b. low voltage test
    c. medium voltage test
    d. none of the above.

80. A full scale aircraft is subjected to an impulse voltage discharge is
    a. corona/streamer test
    b. attachment point test *
    c. either a or b
    d. none of the above.

81. Attachment point test belongs to
    a. high voltage test *
    b. high current test
    c. low voltage test
    d. low current test

82. An impulse electric field producer corona and streamers over a model is
    a. corona/streamer test *
    b. attachment point test
    c. either a or b
    d. none of the above.

83. In high voltage test the rise time & full time impulse voltage wave shape are respectively
    a. 50ms and 1.2ms b. 50ms and 50ms
    c. 1.2ms and 50ms * d. both 1.2ms.

84. Resistance to the blasting and burning effect to the return stroke is obtained of
    a. high voltage test
    b. high current test *
    c. neither a or b
    d. none of the above.

85. The physical damage caused at the point of flash attachment called
    a. direct lighting effect *
    b. indirect lighting effect
    c. neither a or b
    d. both a and b.

86. Which of following not an effect because of direct effect
 a. the attachment of lightning arc
 b. the passage of lightning current through the structure
 c. all of the above
 d. none of the above. *

87. Radomes not provided with lightning protection devices
 a. they cause heavy damage with direct stroke
 b. they cause heavy damage with indirect stroke
 c. return stroke generated by such material puncture it. *

88. Non-conductive composites are
 a. electrical conductor that do not conduct lighting current
 b. electrical insulator that do not conduct lighting current *
 c. both a and b
 d. none of the above.

89. The electric charge that will produce an electric field having one component directed tangentically along the inner surface and one component directed radially through the skin and out to the air. Because
 a. electric field in the composite skin material is higher than electric field in the air due to streamers
 b. electric field in the composite skin material is lower than electric field in the air, due to streamers *
 c. electric field in the composite skin material is same as electric field in the air due to streamers
 d. none of the above.

90. Corona is a phenomenon that occurs
 a. at outer surface spreads inward
 b. at inner surface spreads outward
 c. at inner surface spreads inward
 d. at outer surface spreads outward. *

91. Puncture & surface flashover are caused to
 a. conducting skin
 b. non-conducting skin *
 c. both a & b
 d. none of the above.

92. The time taken by the charge to dissipate from the surface is refered to as
 a. rise time b. full time
 c. relaxation time * d. none of the above.

93. Puncture is most likely to occur in a composite material because they have
 a. microscopic holes * b. macroscopic holes
 c. both a and b d. none of the above.

94. Solid diverters are used
 a. outside of skin * b. inside of skin
 c. both a and b d. none of the above.

95. The fail strips are
 a. conductive aluminium sheet *
 b. non-conducting composite sheet
 c. either conducting as non-conducting composite sheets
 d. none of the above.

96. The disadvantage of solid diverter bars is
 a. it tends to interfere with beam from a radar antenna*
 b. it do not interfere with beam from a radar antinna
 c. either a or b
 d. none of the above.

97. Segmented diverters
 a. provides a metal path to carry a lighting current
 b. do not provide a lighting current flow path *
 c. some times provide a path for lighting current
 d. any of above.

98. Which of following case leaves an ionised channel through which subsequent currents in the same flash can travel
 a. internal diverter b. segmented diverter
 c. fail strips * d. none of the above.

99. Which of following gives protection by melting or vapourising itself
 a. internal diverter b. fail strip *
 c. segmented diverter d. none of the above.

100. Which of following direct protection methods provides a contineous path by providing many small airgaps
 a. internal diverter b. external diverter
 c. segmented diverter * d. fail strip diverter

101. In segmented diverter protection the air gap length to be provided depends upon
 a. amount of current required to ionise
 b. amount of voltage required to ionise *
 c. both a and b
 d. none of the above

102. Conductive materials can be applied to the surface to conduct lightning currents to the airframe
 a. where electromagnetic transparancy is required *
 b. where electromagnetic transparancy is not required
 c. where electric transparancy is not required
 d. where magnetic transparancy is not required.

103. Expanded metal foils
 a. have lower conductivity then metal fabric
 b. have same conductivity as metal fabric
 c. have better conductivity than metal fabric *
 d. have better resistivity than metal fabric.

104. In aluminium fibre glass, glass fibre coated over aluminium
 a. result in significant electrical conductivity
 b. glass provides a heat sink.
 c. none of the above
 d. all of the above. *

105. In metal lauded paints, the resulting conductivity is
    a. higher than that of pure metal film
    b. same as that of pure metal film
    c. lower than that of pure metal film *
    d. none of the above

106. Metal coated carbon fibre composites
    a. decreases conductivity of skin
    b. increases conductivity of skin *
    c. do not alter conductivity of skin
    d. all of above.

107. Windows and window shields are fabricated from materials of
    a. high dielectric strength than the non conductive composites *
    b. lower dielectric strength than the non conductive composites
    c. similar dielective strength as the non conductive composites
    d. none of the above.

108. All the areas of the aircraft surface where a first return stroke is likely during lightning channel attachment with a high expectation of flash hang on
    a. Zone 1A
    b. Zone 1B *
    c. Zone 2A
    d. Zone 2B.

109. The all areas of aircraft surfaces where subsequent return stroke is likely to be swept with a low expectation of flash hung on
    a. Zone 1A
    b. Zone 1B
    c. Zone 2A *
    d. Zone 2B.

110. The all parts/areas of the aircraft surfaces into which a lightning channel carrying a subsequent return stroke is likely to be swept with a high expectation of flash hang on
    a. Zone 1A
    b. Zone 2A
    c. Zone 2B *
    d. Zone 1B.

■■■

CHAPTER - 103
COMPOSITE MATERIALS

1. What is a composite material ?
   a. recycled steel
   b. a chemical reaction
   c. the lastest computer software
   d. a structural material consisting of two or more constituents.*

2. Advanced composite materials are
   a. naturally found composites
   b. traditionally used in aerospace industries *
   c. low performance composites
   d. made of wood

3. What fiber factors contribute to the mechanical performance of a composite ?
   a. length b. orientation
   c. shape d. all of the above.*

4. PMC stands for
   a. polymer metal composition
   b. polymer matrix composite *
   c. polyethylene metal composition
   d. polyester matrix composites.

5. The most commonly used advanced composite materials are
   a. metal matrix composites
   b. polymer matrix composites *
   c. ceramic matrix composites
   d. carbon carbon composites.

6. The most common fibers used in advanced polymer composites are
   a. glass, steel and aluminium
   b. glass, graphite and kelvar *
   c. glass, steel and kelvar

7. E-glass type fibre is used for
   a. electrical applications *
   b. environmental applications
   c. evaporative applications
   d. appearance applications.

8. SMC stands for
   a. Structural metal composite
   b. strong metal composite
   c. sheet molding compound
   d. sheet molding composite.*

9. Annual growth of composites is at a steady rate of .... percent.
   a. 0 b. 10 *
   c. 20 d. 30.

10. Reducing one pound of mass in a typical passenger aircraft such as Airbus 300 can save up to .... gallons of fuel per year ?
    a. 35 b. 350
    c. 3500 d. 35000.

11. The most common fiber cross-sectional shape is
    a. rectangular * b. triangular
    c. circular d. square.

12. The resistance to crack prpogation is measured by fracture toughness. The units of fracture toughness are
    a. MPa-m b. MPa^0.5-m
    c. MPa-m^0.5 d. MPa^0.5m^0.5

13. Typical range of carbon content in a carbon fiber is .... %
    a. 93-95 b. 92-95 *
    c. 93-94 d. 90-95.

14. Typical range of carbon content in a graphite fiber is .... %.
    a. 99 * b. less than 99
    c. more than 99 d. 95%

15. Thermoset plastic polymers have the following type of bonding
    a. covalent bond b. vanderwaals bond
    c. atomic bond d. none of the above.

16. Current service temperature limits for polymers reach approximately
    a. 750 F b. 1500 F
    c. 2000 F d. 2900 F.

17. Mechanical fasteners are generally made of this type of composite
    a. boron-epoxy b. graphite-epoxy
    c. carbon-carbon d. all of the above.

18. The definition of isotropic material means a material with
    a. different properties in all directions
    b. same properties in all directions
    c. same properties from point to point
    d. different properties from point to point.

19. The definition of anisotropic material means a material with
    a. different properties in all directions
    b. same properties in all directions
    c. same properties from point to point
    d. different properties from point to point.

20. Inter-ply hybrid composites consist of
 a. two or more different composite systems *
 b. two or more different fibers used in the same ply

21. Aramid fibers are made up of the following elements
 a. carbon, hydrogen, oxygen and graphite
 b. carbon, hydrogen, oxygen and nitrogen
 c. carbon, hydrogen, oxygen
 d. carbon, hydrogen, nitrogen.

22. A typical example of thermoplastics is
 a. polyethylene * b. polyesters
 c. phenolics d. epoxy.

23. Polymer matrix composites are manufactured in the automotive industry for short production runs by
 a. filament winding
 b. autoclave forming
 c. resin transfer molding
 d. none of the above.

24. Which of the following composite materials is replacing metals in golf club shafts ?
 a. carbon-carbon b. graphit-epoxy
 c. boron-epoxy * d. none of the above.

25. Which of the following is a drawback for phenolic resin systems ?
 a. high cost
 b. low mechanical strength
 c. high void content
 d. brittleness.

26. Bullet proof vests use the following fibers
 a. boron b. glass
 c. graphite d. kelver. *

27. High performance applications in the aerospace industry most commonly use the following fibers
 a. graphite * b. boron
 c. kelvar d. steel.

28. Thermoset polymers show which of the following characteristics ?
 a. decompose on heating *
 b. soften on heating
 c. harden on heating

29. The performance indicator for buckling of a rod under a compressive load is
 a. Young 's modulus/density
 b. young 's modulus ^ (1/2) / density
 c. young 's modulus ^ (1/3) / density

30. Specific modulus is given by
 a. young 's modulus ^ (1/2) / density
 b. young 's modulus / density
 c. strength / density
 d. strength ^ (1/2) / density

31. Glass fibers are made from
 a. silica *
 b. vapor deposition method
 c. graphite

32. Which polymer is the least desirable for smoke emmision ?
 a. epoxy b. phenolic
 c. polymide d. silicone.

33. Which polymer is the most desirable for smoke emmision ?
 a. epoxy b. phenolic
 c. polymide d. silicone.

34. Which polymer has the maximum strength ?
 a. epoxy b. phenolic
 c. polyester d. polymide
 e. silicone.

35. Which polymer has the least strength ?
 a. epoxy b. phenolic
 c. polyester d. polymide
 e. silicone.

36. Which polymer costs the most ?
 a. epoxy b. phenolic
 c. polyester d. polymide
 e. silicone.

37. Which polymer costs the least ?
 a. epoxy b. phenolic
 c. polyester d. polymide
 e. silicone.

38. Which polymer has the highest service temperature ?
 a. epoxy b. phenolic
 c. polyester d. polymide
 e. silicone.

39. Which Polymer has the lowest service temperature ?
 a. Epoxy b. Phenolic
 c. Polyester d. Polymide
 e. Silicone

40. Macromechanical analysis of a lamina is based on average properties by considering the lamina to be:
 a. isotropic b. anisotropic
 c. non homogeneous d. homogeneous.

41. The young's modulus a unidirectional lamina is usually much larger in the direction :
 a. of the fibers
 b. perpendicular to the fiber direction
 c. at 45 degrees to the fiber direction
 d. at 60 degree to the fiber direction.

42. The component of the stress normal to the surface is called the normal stress, and the stress parallel to the surface is called the .... stress.
 a. von-mises b. maximum normal
 c. shear d. contact.

43. A general working definition of strain can be given as the
    a. final length divided by the initial length
    b. change in length
    c. change in length divided by the final length
    d. the change in length divided by the initial length.

44. How many independent constants are there in the general stiffness matrix of a 3-D anisotropic material ?
    a. 2 b. 5
    c. 9 d. 13
    e. 21

45. How many independent constants are there in the general stiffness matrix of a 3-D orthotropic material ?
    a. 2 b. 5
    c. 9 d. 13
    e. 21

46. How many independent constants are there in the general stiffness matrix of a 3-D monoclinic material ?
    a. 2 b. 5
    c. 9 d. 13
    e. 21

47. How many independent constants are there in the general stiffness matrix of a 3-D transversely isotropic material ?
    a. 2 b. 5
    c. 9 d. 13
    e. 21

48. How many independent constants are there in the general stiffness matrix of a 3-D isotropic material ?
    a. 2 b. 5
    c. 9 d. 13
    e. 21

49. An example of a monoclinic material is :
    a. steel b. feldspar
    c. fiberglass.

50. An example of an orthotropic material is :
    a. steel b. feldspar
    c. fiberglass.*

51. An example of an isotropic material is :
    a. steel
    b. feldspar
    c. fiberglass.

52. Which of the following definitions describes an orthotropic material ? A material with .... of material symmetry.
    a. one plane
    b. three mutually perpendicular planes
    c. an infinite number of planes
    d. no plane.

53. The stiffness and compliance matrix for an isotropic material can be calculated by knowing the following two material properties ?
    a. modulus of elasticity and poisson ratio
    b. modulus of elasticity and thermal expansion coefficient.
    c. shear modulus and thermal expansion coefficient
    d. shear modulus and ultimate tensile strength.

54. A unidirectional lamina falls best under which of the following material categories ?
    a. isotropic b. anisotropic
    c. monoclinic d. orthotropic.

55. If the strength ratio is greater than one, a lamina is considered to
    a. be safe * b. heavy failed
    c. may or may not fall.

56. Failure at a point in a body, according to the Tsia-Hill theory, is assumed to occur when the distortion energy at that point is .... the failure distortion
    a. less than b. greater than
    c. half

57. The concept of strength ratio applies to
    a. maximum strain failure theory
    b. maximum stress failure theory
    c. Tsai-Hill failure theory only
    d. all failure theories.

58. The maximum stress and maximum strain failure theories give different results for every loading case except
    a. only if the major poisson's ratio is zero
    b. only if the mode of failure is shear in both failure theories
    c. both of the above.

59. Which failure theory is based on the total strain energy failure theory of Beltrami ?
    a. maximum strain failure theory
    b. maximum stress failure theory
    c. Tsai-Hill failure theory
    d. Tsai-Wu failure theory

60. The mode of failure cannot be found by using the
    a. maximum stress failure theory
    b. maximum strain failure theory
    c. Tsai-Hill failure theory

61. The units of thermal expansion are
    a. m/m b. m/m/C
    c. m/C d. m/m/C/C

62. The units of moisture expansion are
    a. m/kg b. m/m/kg
    c. m/m/kg/kg d. m/kg/kg

63. The units of moisture concentration are
    a. m/m b. kg/kg
    c. m/m/kg/kg d. kg/m

64. Transformation of stresses at a point in a coordinate system to another is dependent on
    a. elastic properties of the material
    b. elastic properties of the material and the angle between the tv
    c. the angle between the two co-ordinate system.

65. Compliance of a material is defined as
    a. stiffness of a material
    b. inverse of stiffness of a material

66. The definition of stress is
    a. load on a body
    b. load per unit area of the body *
    c. load per unit length of the body.

67. A unidirectional lamina with a rectangular arrangement best falls under the category of......................material.
    a. transversely isotropic b. orthotropic
    c. monoclinic d. anisotropic.

68. An isotropic material has .... planes of symmetry ?
    a. 2 b. 5
    c. 9 c. infinite.

69. A unidirectional lamina with a random, hexagonal or square arrangement best falls under the category of .... material.
    a. transversely isotropic b. orthotropic
    c. monoclinic d. anisotropic.

70. Fiber volume fraction is defined as
    a. volume of fibers/volume of matrix
    b. volume of fibers/volume of composite
    c. 1 plus the matrix volume fraction
    d. volume of composites/volume of fibers.

71. The change of properties for a corresponding 1 percent increase in void content is in the range of
    a. 2 to 10 percent
    b. less than 2 percent
    c. 2 to 15 percent
    d. greater than 15 percent.

72. The maximum fiber volume fraction for circular fibers in a square array is
    a. 70.23 percent. b. 90.69 percent
    c. 78.54 percent d. 86.93 percent.

73. The maximum fiber volume fraction for circular fibers in a hexagonal array is
    a. 78.54 percent b. 90.69 percent
    c. 70.23 percent d. 86.93 percent.

74. Concerning the Halphin-Tsai equations for transverse elastic modulus, the reinforcing factor depends on
    a. young's modulus of the fibers
    b. young's modulus of the matrix
    c. fiber volume fraction
    d. packing geometry.

75. The volume fraction of voids is generally determined by
    a. burn or acid digestion tests
    b. tension tests
    c. impact tests
    d. purely analytical means.

76. Volume fraction of voids is given by
    a. (theoretical minus experimental composite density)/theoretical
    b. (theoreticalminus experimental composites density)/experimental
    c. void volume/(fiber volume plus composite volume)
    d. (experimental minus theoretical composite density)/experimental.

77. Bending moment per unit width is inversely proportional to the
    a. square of the thickness
    b. cube of the thickness
    c. mass
    d. square of the mass.

78. For a laminate to be safe, the strength ratio in each ply must be
    a. less than 1 b. greater than 1 *
    c. equal to zero d. not equal to zero.

79. In a spherical pressure vessel under uniform internal pressure the
    a. hoop stress is the same as the longitudinal stress
    b. hoop stress is twice the longitudinal stress
    c. hoop stress is half the longitudinal stress.

80. The [B] matrix is equal to zero for which of these laminates ?
    a. [0,90] b. [0,45]
    c. 0,45,45,0] d. [0,45,-45].

81. Which of the following will expand the most with temperature ?
    a. steel
    b. aluminium *
    c. graphite/epoxy in the direction parallel to the fiber
    d. glass/epoxy in the direction perpendicular the fibers

82. Which of the following laminates will not undergo bending from thermal loads ?
    a. [0,45,-45] b. [0,45,90,90,45,0]
    c. [0,30,-45] d. [0,45,90,45,-45].

83. Hygrothermal stresses and strains are caused by
    a. water pressure
    b. air pressure
    c. change in humidity and temperature *
    d. normal loads.

84. If a hygrothermal load is the only load applied to a lamina, the overall mechanical load is equal to
    a. the same magnitude as the hygrothermal load
    b. slightly less than the hygrothermal load
    c. the inverse of the hygrothermal load
    d. zero.

85. Hygrothermal forces are considered fictitious thermal forces because
    a. they don't exist
    b. they act like mechanical forces, but no mechanical force is present
    c. they are uncommon
    d. they can only be produced in a laboratory.

86. Non-symmetric laminates .... when hygrothermal loads are applied.
    a. warp b. fall apart
    c. do not change d. fall.

87. Which of the following laminates will not undergo warpage due to hygrothermal loads
    a. [0,90] b. [0,90,45]
    c. [0,45,-45,0] d. [45,90].

88. Matrix [A*] is known as the
    a. transformation matrix
    b. extersional compliance matrix
    c. bending stiffness matrix
    d. coupling stiffness matrix.

89. The coupling matrix [B] is zero for
    a. all analysis that need simplification
    b. non-symmetric laminates
    c. symmetric laminates
    d. all quasl isotropic laminates.

90. A typical graphite epoxy lamina of 0.005 inch thickness will fail at about an extension load of
    a. 75 pounds b. 750 pounds
    c. 7500 pounds d. 75000 pounds.

91. Which one of the following assumptions does not relate to the classical lamination theory ?
    a. each lamina is orthotropic
    b. the lamina is thin with only in-plane loads
    c. each lamina is elastic
    d. slip occurs between lamina interfaces.

92. [0/90/90/90/0] is an example of
    a. an angle ply laminate
    b. unsymmetric laminate
    c. cross-ply laminate.

93. [A][B] and [D] are called
    a. extensional, coupling and bending stiffness matrices, respectively
    b. extensional, decoupling and dbending stiffness matrices respectively
    c. coupling, bending and extensional stiffness matrices respectively
    d. none of the above.

94. The [B] matrix for an a symmetric laminate is
    a. zero
    b. non-zero

95. The extensional stiffness matrix [A] for a laminate will not change if
    a. stacking sequence is changed
    b. angle of piles is changed
    c. elastic properties of the lamina are changed.

96. Which matrix has to equal zero in order to avoid warpage due to thermal loading in a laminate ?
    a. extensional stiffness matrix
    b. coupling matrix
    c. bending stiffness matrix.

97. Give an example of a symmetric laminate :
    a. [0/30/30/0/30] b. [0/45/45]
    c. [0/30/0]

98. What angle plies are used to make a cross-ply laminate?
    a. 0,80 b. 0,45,-45,90
    c. 0,90 d. 45,-45.

99. Give an example of a balance laminate ?
    a. [30/-30] b. [45/30]
    c. [0,30,-45] d. [60/30].

100. What does a quasi-isotropic laminate simulate ?
    a. an isotropic metal in extension
    b. an isotropic material in bending
    c. an isotropic material in both bending and extension.

101. What is the minimum number of plies to make a quasi-isotropic laminate ?
    a. 2 b. 3
    c. 4.

102. If one ply fails in a laminate, does the entire laminate fail ?
    a. no * b. yes
    c. may be.

103. A[0/90] laminate is
    a. quasi-isotropic
    b. not quasi-isotropic
    c. may or may not be quasi-isotropic.

104. In a cylindrical pressure vessel under uniform internal pressure the
    a. hoop stress is the same as the longitudinal stress
    b. hoop stress is twice the longitudinal stress
    c. hoop stress is half the longitudinal stress.

105. In a spherical pressure vessel under uniform internal pressure the
    a. hoop stress is the same as the longitudinal stress
    b. hoop stress is twice the longitudinal stress
    c. hoop stress is half the longitudinal stress.

■■■

CHAPTER - 104
APPLICATION OF COMPOSITES IN AIRCRAFT INDUSTRY

1. Fibre reinforced composites has become increasingly attractive alternative to the conventional metals mainly due to
   a Their increased strength and durability
   b. Their resistance to corrosion and fatigue
   c. Their damage tolerance characteristics
   d. all of the above *

2. Individual composite parts are about
   a. 5 - 10% lighter than their conventional metal counter parts
   b. 10 - 20% lighter than their conventional metal counter parts
   c. 20 - 30% lighter than their conventional metal counter parts *
   d. 40 - 50% lighter than their conventional metal counter parts

3. The most common fibres are
   a. carbon and aramid
   b. aramid and glass
   c. glass and their hybrid and aramid
   d. carbon, aramid, glass and their hybrid *

4. The first structural aircraft components of composits were introduced during
   a. 1910 - 20   b. 1920 - 30
   c. 1930 - 40   d. 1950 - 60 *

5. AFRP possess
   a. high density
   b. high tensile strength *
   c. high compressive strength
   d. all of the above

6. Phenolic resin system is used because of
   a. excellent fire resistant properties
   b. low flammability
   c. low smoke
   d. all of the above *

7. The predominant design considerations for interior components are
   a. impact resistance   b. stiffness
   c. surface smoothness   d. all of the above *

8. Airbus industries used advanced composites on the airbus A 300 Aircraft which first flew in
   a. 1982   b. 1972 *
   c. 1962   d. 1952

9. Use of composites was extended to airbus A 310 aircraft during
   a. 1980 - 1985 *   b. 1970 - 1975
   c. 1960 - 1965   d. 1950 - 1955

10. Use of composites was extended to airbus A 320 aircraft in
   a. 1967   b. 1977
   c. 1987 *   d. 1997

11. Component made of composite materials in Airbus A 300 B2 / B4 is
   a. radome *   b. rudder
   c. aileron   d. all of the above

12. On Airbus A 300 B2 / B4 aircraft
   a. only glass fibre structures have been used *
   b. only AFRP have been used
   c. only CFRP have been used
   d. none of these

13. Composites account for about
   a. 15 % of the structure of Airbus A 300 aircraft *
   b. 30 % of the structure of Airbus A 300 aircraft
   c. 45 % of the structure of Airbus A 300 aircraft
   d. 60 % of the structure of Airbus A 300 aircraft

14. Composites account for about
   a. 6 % of the structure of airbus A 330 / A340 aircraft
   b. 12 % of the structure of airbus A 330 / A340 aircraft*
   c. 15 % of the structure of airbus A 330 / A340 aircraft
   d. 24 % of the structure of airbus A 330 / A340 aircraft

15. Aircraft enegry efficiency (ACEE) programme was initiated by NASA
   a. in 1952   b. in 1962
   c. in 1972 *   d. in 1982

16. Composites account for about
   a. 10 % of the structure of Boeing 777 *
   b. 10 % of the structure of Boeing 767
   c. 10 % of the structure of Boeing 757
   d. 10 % of the structure of Boeing 737 - 400

17. In Boeing B 777 Aircraft, Engine cowling consists of
   a. CFRP *   b. FG
   c. Hy   d. TCFRP

18. The weight of the wing box was reduced by
   a. 130 kg, with use of CFRP instead of aluminium *
   b. 30 kg, with use of CFRP instead of aluminium
   c. 230 kg, with use of CFRP instead of aluminium
   d. 330 kg, with use of CFRP instead of aluminium

19. Most military aircraft applications use
   a. carbon fibre reinforced epoxy composites *
   b. glass fibre reinforced composites
   c. fibre glass
   d. all of the above

20. On the F - 18 aircraft, carbon fibre reinforced composites makeup approximately
    a. more than 50% of the surface area *
    b. less than 50% of the surface area
    c. less than 30% of the surface area
    d. less than 20% of the surface area

21. On the Typhoon Aircraft, carbon - fibre reinforced composites make up
    a. approximately 30% of the structural weight *
    b. approximately 40% of the structural weight
    c. approximately 50% of the structural weight
    d. approximately 60% of the structural weight

22. GFRP main rotor blades 50% have a service life of around
    a. 1000 hours b. 2000 hours
    c. 10000 hours * d. 20000 hours

23. Damage extending to an area of
    a. 500 mm x 250 mm have been repaired successfully*
    b. 500 mm x 500 mm have been repaired successfully
    c. 1000 mm x 250 mm have been repaired successfully
    d. none of these

24. Repair is carried out under controlled temperature of
    a. 20 - 25 °C * b. 30 - 35 °C
    c. 40 - 45 °C d. 50 - 55 °C

25. Relative humidity for composite repair should be
    a. 50 % or less * b. 70 % or less
    c. 80 % or less d. 90 % or less

26. Repair procedure involves
    a. cutting of debonded area
    b. removal of strainless steel mesh
    c. removal of CFRP layer
    d. all of the above *

27. Temperature at the repair area should be around
    a. 80 °C * b. 100 °C
    c. 120 °C d. 140 °C

28. Heat pump is used at the repair area for about
    a. 4 hours b. 6 hours *
    c. 8 hours d. 10 hours

29. Final curing is done by
    a. vacuum bagging at 93 °C
    b. with a soak time of 3 hours
    c. with a soak time of 6 hours
    d. both a. and b. *

30. The vacuum bag is actually a plastic film capable of withstanding temperature up to
    a. 200°C b. 260 °C *
    c. 300 °C d. 340

31. The main, in-service, defect experienced in the industry on radome has been mainly attributed to
    a. varying aerodynamic loads
    b. moisture ingress
    c. FOD like bird hit d. all of the above *

32. For damage to comparatively large area, upto 500 mm, repair is carried out by
    a. replacing the damaged composite material *
    b. resin injection method
    c. both a. and b.
    d. none of the above

33. The C - duct is formed of
    a. two walls * b. three walls
    c. four walls d. five walls

34. Galvanic corrosion has been experienced between
    a. Aluminium perforated skin and the stainless steel wire mesh *
    b. Iron per forated skin and stainless steel wire mesh
    c. copper perforated skin and the stainless steel wire mesh
    d. all of the above

35. The problem of galvanic corrosion has been resolved by
    a. Complete removal of stainless steel wire mesh *
    b. complete removal of aluminium perforated skin
    c. complete removal of stainess steel wire mesh and aluminium perforated skin
    d. none of the above

36. 20 - 30% of the components for the super airbus A 380 which will carry 550 passengers, are expected to be made of
    a. CFRP * b. TCFRP
    c. TI d. Al

37. The J - nose elements are reinforced by arch - shaped ribs so that
    a. they are extremely rigid in the flight direction
    b. they can follow the motion of the wings in the transverse direction
    c. they can follow vibrations of the wings in the transverse direction
    d. all of the above *

38. GLARE composite can take loads upto
    a. 25 % higher than bare aluminium *
    c. 50 % higher than bare aluminium
    c. 75 % higher than bare aluminium
    d. 100 % higher than bare aluminium

39. GLARE would be used in the skin,
    a. mainly towards the front of the cabin section
    b. mainly towards the rear of the cabin section
    c. mainly towards the front and rear of the cabine section *
    d. none of the above

40. GLARE
    a. can be repaired if damaged
    b. is far more fire resistant than either aluminium
    c. can take loads upto 25 % higher than bare aluminium
    d. all of the above *

■■■

CHAPTER - 105
RESINS, ADHESIVES & GLUES

1. The state in which two surfaces are held together with interfacial forces is called
   a. cohesion b. adhesion *
   c. bonding covalent d. none of the above.

2. The components which are joined together by inter facial forces are called
   a. substrate b. adherend
   c. any of the a. and b.* d. none.

3. The class of solid or semi solid organic material with no definite point are called
   a. Resins * b. Adhesive
   c. Glues d. None of these.

4. The resins used are derived mainly from
   a. ethylene b. butylene
   c. propylene d. all of these *

5. The resins used in formulating adhesive have
   a. high molecular weight *
   b. low molecular weight
   c. definite melting point
   d. definite boiling point.

6. Adhesive bonding have which of the following advantage
   a. ability to join variety of materials
   b. to join very thin films
   c. good sealing and insulating
   d. all the above *

7. Fabrication of complex shape can be done with the help of
   a. screwed fastenings b. Riveted fastening
   c. Adhesive bonding * d. None of the above.

8. Thermosetting polyamides and modified epoxies are capable of long term service at ------------ temperatures
   a. 150°C b. 250°C *
   c. 300°C d. 450°C

9. Inorganic materials
   a. can function as adhesives upto 1500°C
   b. they are brittle
   c. are prone to thermal and mechanical shocks
   d. all the above *

10. Which of the following is the limitation of adhesive
    a. unwanted residual stresses may arise
    b. they tend to creep under sustain loading
    c. bonded structures are not easily dismantled
    d. all the above *

11. Which of the following is the property of the liquid adhesives
    a. they exist as solvent dispersions or as aqueous solutions
    b. they are easy to apply
    c. they have possibility of viscosity controls
    d. all the above *

12. Most thermoplastics can function
    a. solvent based adhesives *
    b. solute based
    c. both
    d. none.

13. Which of the following is not a synthetic resin
    a. acrylic b. shellac *
    c. vinyl d. styrene.

14. Which of the following is not a thermosetting adhesive
    a. poly amides * b. poly acrylates
    c. polyurethane d. poly ethers

15. Inorganic cements processed by high temperature fusion are
    a. thermoplastic * b. thermocontroling
    c. thermostable d. none of these.

16. The hot and cold setting adhesives are based on
    a. epoxy b. phenolic
    c. polyesters d. all *

17. Which of the following is true
    a. chemical setting adhesives are infusible, thermoplastics are not *
    b. chemical setting adhesives are soluble thermoplastics are not
    c. thermoplastic setting adhesives may be formulated to enhance a property
    d. all the above.

18. The bond strength of any adhesive increased by curing with
    a. heat * b. pressure
    c. vulcanization d. none of the above.

19. The use of pressure in adhesives favour
    a. good bond formation
    b. thinner glue lines of high strength
    c. both *
    d. none.

20. Time requirement for curing of adhesives depend upon
    a. pressure b. temperature applied
    c. joint strength required d. all the above *

21. Chemical catalyst, the temperature required is
   a. 350°C * b. 300°C
   c. 220°C d. 120°C.

22. Which of the following is a property of urea formaldehyde ?
   a. these are moisture resistance
   b. they have limited resistance to hot water
   c. they have poor resistance to boiling water
   d. all the above *

23. Which of the following is not a property of phenol formaldehyde
   a. the joints made by this are weather proof
   b. the joints made by this are boil proof
   c. they have poor resistant to micro organisms *
   d. they are highly resistant to dry heat.

24. Which of the following adhesive does not have resistance against bio-detector atom
   a. phenol formaldehyde
   b. malanine formaldehyde
   c. resornicol formaldehyde
   d. starch. *

25. The adhesives can be classified on the basis of its
   a. chemical ingredients b. setting agents
   c. durability ratings d. all the above *

26. Adhesives that comprise of materials of vegetable or animal origin are called
   a. natural products * b. thermoplastics
   c. thermosets d. elastomers.

27. The adhesives comprising natural and synthetic resins are called
   a. thermoplastics * b. synthetic polymers
   c. elastomers d. composite polymers.

28. Adhesives based on synthetic polymer are called
   a. thermoplastics b. elastomers
   c. composite polymers d. thermosets *

29. Adhesives comprising rubber like materials are called
   a. thermoplastics
   b. thermosets
   c. elastomers *
   d. composite compositions.

30. Adhesives consisting of composite materials derived from thermoplastics etc. are called
   a. thermosets
   b. elastomers
   c. elastotecs
   d. composite compositions *

31. The simplest natural adhesives include
   a. Starch b. Dextrin
   c. Natural gums d. All the above *

32. Which of the following is not true for Dextrins and starches
   a. they are employed for fast machine packaging
   b. they have rapid drying properties
   c. they consist of composite materials *
   d. all the above.

33. Which of the following is false
   a. the simplest adhesives are of vegetable origin
   b. the use of vegetable origin adhesives is limited to paper cardboard, foil and light plywood structures
   c. animal glues have higher joint strengths than vegetable oils
   d. none of the above *

34. Casein adhesives have long been used to make
   a. cardboard b. durable plywood *
   c. paper boxes d. all the above.

35. Which of the following is true about the casein adhesives
   a. they are used in making of durable plywood
   b. they do not resist prolonged weather
   c. they have good gap filling properties
   d. all the above *

36. Which of the following is the property of the thermoplastics
   a. fusible b. soluble
   c. soft d. all the above *

37. The poor creep strength in the thermoplastics is compensated by
   a. Modifying joint design *
   b. High -quality joint
   c. Good weather resistance
   d. All the above.

38. Which of the following is not a thermoplastic
   a. polyvinyl acetate b. polyvinyl alcohol
   c. polyester * d. polyacrylates.

39. The most important applications of thermoplastics is
   a. Assembly packings
   b. plastic film laminates
   c. both *
   d. none.

40. Thermoplastics are available as
   a. tapes b. films
   c. powders d. all the above *

41. ------------------ are employed for interior wood jointing
   a. polyethylene b. polyvinyl acetate *
   c. polyamides d. polyacrylic.

42. --------------------- is used as the attachment of bonnet stiffness
   a. polyvinyl chloride * b. polyvinyl acetate
   c. polyester d. poly alcohol

43. Which of the following is true for cyanoacrylates
    a. they are high viscosity fluids
    b. they set in a long time
    c. they can be used with metals *
    d. all the above.

44. Gapfilling properties of cyanocrylates are
    a. good b. poor *
    c. depend on pressure d. fair.

45. Loctite is an
    a. polyvinyl alcohol b. polyester alcohol
    c. acrylic polyester * d. none of the above.

46. Loctite is used for
    a. Nuts bolts and studs *
    b. bonnet stiffness
    c. card board, papers
    d. all the above.

47. Thermosetting resins solidify by polymerization through the action of
    a. heat b. chemical reaction
    c. any of the above * d. none of the above.

48. Thermo sets
    a. can be remelted b. cannot be remelted *
    c. can be recycled d. none of the above.

49. Which of the following is true for thermosets
    a. they do not compose below 200°C
    b. they provide strong joints
    c. they have good creep properties
    d. all the above *

50. Which of the following is not a thermoset
    a. acrylic polyester resins *
    b. amino resins
    c. phenolic resins
    d. epoxy resins.

51. Araldite is
    a. phardic resin b. amino resin
    c. epoxy resin * d. acrylic resin.

52. Which of the following is not the advantage of epoxy resins over other thermosets
    a. they have high adhesion strength
    b. they have high cohesive strength
    c. high bonding pressures *
    d. excellent resistance to oils.

53. Which of the following is the property of epoxy resins
    a. brittleness b. low flexibility
    c. poor impact resistance d. all the above *

54. Which of the following is Elastomers
    a. polysulphide b. polyamide
    c. both a. & b. * d. polycarbide.

55. Filler materials are
    a. silica powder b. alumina powder
    c. metal powder d. all the above *

56. ------------- adhesives release water during cure
    a. amino resins b. polysulphide
    c. formaldehyde * d. all the above.

57. Elastomers are available as
    a. solvent solutions b. emulsions
    c. water dispersions d. all the above *

58. Which of the following is false for elastomers
    a. they have high strength *
    b. they have high flexibility
    c. their use is restricted as bonding materials as paper
    d. all the above.

59. Which of the following is an elastomer
    a. nitrile adhesives
    b. styrene butadiene adhesives
    c. neoprene adhesives
    d. all the above *

60. Which of the following adhesive is most versatile particularly with respect to oil
    a. nitrile * b. styrene butadiene
    c. neoprene d. all the above.

61. Which of the following elastomers is superior to other rubber adhesives in rapid bonding
    a. nitrile b. styrene butadiene
    c. neoprene * d. all the above.

62. --------------- adhesives have better ageing properties than natural rubber
    a. nitrile b. styrene butadiene *
    c. neoprene d. all the above.

63. ----------------- adhesives are widely used in foot wear industry
    a. nitrile b. styrene butadiene
    c. neoprene * d. all the above.

64. Which of the following is the property of the good adhesive
    a. it should have zero or near zero contact angle
    b. it should have relatively low viscosity
    c. it should be able to displace any trapped air
    d. all the above *

65. Which of the following theories explain intrinsic adhesiveness
    a. diffusion theory b. electronic theory
    c. adsorptions theory d. all the above *

66. ----------------- theory states that the adhesion is due to mutual diffusion of polymers
    a. electronic theory b. diffusion theory *
    c. adsorption theory d. none of the above.

67. Electron spectroscopy has been used for
a. qualitative analysis b. quantitative analysis
c. both the above * d. none

68. Augur electron spectroscopy is used to complement to
a. XPS * b. YPS
c. TPS d. none of the above.

69. Morphological information is obtained from
a. Auger electron spectroscopy
b. XPS (electron spectroscopy)
c. Scanning electron microscopy *
d. None.

70. The trapped air bubble
a. becomes the source of high bonding
b. becomes the source of debonding *
c. is due to modulous of elasticity.
d. none of the above.

71. The air bubble
a. is the interfacial imperfection
b. increases localised stresses
c. causes debonding
d. all the above *

72. Which of the following things, during curing, decreases the adhesive durability
a. high temperature b. high pressure
c. air trapped * d. all the above.

73. With increasing temperature, the bond strength
a. increases b. decreases *
c. remains same d. none of the above.

74. ---------------------- gives the greatest problem in an environmental stability of adhesive joints
a. air b. water *
c. sand d. smoke.

75. Water may enter the adhesive joint by the method of
a. diffusion b. wicking
c. capilary action d. all the above *

76. After entering a joint, water may cause weakening by
a. plasticisation
b. causing the adhesive to hydrolyse
c. inducing swelling stresses
d. all the above *

77. Water has which of the following effects on adherend
a. it may attack the oxide layer
b. it may contribute in corrosion of metallic substrate
c. any of the above *
d. none of the above.

78. The stresses present in the adhesive bonded joints are
a. shear b. cleavage
c. peel d. any of the above *

79. ----------------- stresses arise as a result of an offset tensile force or bending moment in the joint
a. shear b. cleavage *
c. peel d. normal.

80. ------------------- stresses arise when one or both of the substrates are flexible
a. normal b. shear
c. cleavage d. peel *

81. Fracture will be caused easily if
a. joint is wide * b. applied peel is high
c. joint is narrow d. all the above.

82. The stress concentration in the joint should be
a. high
b. low *
c. strength does not depend on stress concentration
d. none of the above.

83. Non destructive tests are used to asses the
a. quality of the joint * b. quantity of the joint
c. both d. none.

84. The defects in the joint may arise from
a. porosity b. cracks
c. voids d. any of the above *

85. The cellulose self adhesive tapes used in industries will be in ---------- colour
a. black * b. blue
c. red d. green

86. High adhesive tapes are
a. black b. yellow
c. red d. any light colour *

87. Rubberised insulation tape is based on
a. neoprene b. cellulose *
c. starch d. all.

88. Shelf life of type 1 rubberised tape is
a. 2 months b. 4 months
c. 6 months d. 8 months *

89. Shelf life of type 2 rubberised tape is
a. 2 months b. 4 months
c. 6 months * d. 8 months

90. --------------- is used for fabrication of power loom cables
a. dual mix cement
b. proto seal LX
c. araldite
d. cellulose self adhesive tapes *

91. Resorcinol is a type of
a. phenolic resin * b. alcoholic resin
c. acrylitic resin d. aliphatic resin.

92. ------------------ is used for the gap filling joints on wood during aircraft constructions
    a. dual mix cement b. alcoholic resin
    c. resorcinol resin * d. proto seal LX.

93. Which of the following is true for araldite
    a. it gives medium to hard bonds to metals
    b. they have excellent resistance to shock
    c. they can be used between the temperature of -60°C to 60°C
    d. all the above *

94. Araldite has
    a. corrosive action on Al sheets
    b. no corrosive action on Al sheets *
    c. depends on the medium
    d. none of the above.

95. -------------------- is used for insulation of electrical and electronic components
    a. araldite * b. dual mix cement
    c. proto seal LX d. none of the above.

96. --------------------- is used for bonding metals to non metals
    a. araldite * b. dual mix cement
    c. proto seal LX d. none of the above.

97. Which of the following is the property of proto seal LX - IS
    a. it is a low molecular weight plasticizer
    b. it is a type of fluid
    c. its thickness needs to be controlled
    d. all of the above *

98. The water content obtained by volume in Proto seal LX is
    a. 0.5 % max b. 0.4 % max
    c. 0.1 % max * d. 0.3 % max.

99. ---------------- is used for surface pretreatment prior to adhesive bonding
    a. Araldite b. Proto seal LX *
    c. Dual mix cement d. Cellulose tape.

100. Proto seal LX is -------------------- based
    a. Water b. Lanolin *
    c. Styrene d. Polyamine.

101. Which of the following is true for Dual mix cement
    a. it is two component adhesive
    b. it is of cold curing type
    c. it is based on natural rubber
    d. all the above *

102. Which of the following is disadvantage of Dual mix cement
    a. it is of high viscosity
    b. it is highly inflammable *
    c. it is moisture absorbing
    d. all the above.

103. The shelf life of dual mix cement is
    a. 2 months b. four months
    c. 6 months * d. 8 months.

104. The drying time needed for Dual mix cement is
    a. 5 minutes b. 3.5 minutes *
    c. 4 hours d. 1.5 hours.

105. --------------- is used for repair of proofing layers of flexible fuel tanks of Hunter and Vampire aircraft
    a. Areldite b. Lanolin
    c. Dual mix cement * d. Proto seal LX.

106. Which of the following is true for glue CR - RP --150.
    a. it is used for gluing rubber to metals
    b. it is used for gluing rubber to glasses
    c. it is used for gluing rubber of rubber
    d. all the above *

107. CR- RP- 150 is --------------- based
    a. Lanoline b. Gento amine
    c. Poly chloroprene * d. Neoprene.

108. ----------------- is used for gluing rubber to metals, glass & rubber by cold method
    a. lanolin b. Araldite
    c. CR - RP - 150 * d. none of the above.

109. Glue CLR - 33.5 is a ------------------ glue
    a. Nitro amine b. Nitro cellulose *
    c. Nitro alcohol d. Neoprene

110. Which of the following is true about glue CLR - 33.5
    a. it is a nitro cellulose glue
    b. it is a solution of nitro cellulose & resin in mixture of organic solvent
    c. it is equivalent to Russian glue AK - 20
    d. all the above *

111. The colour of CLR-33.5 is
    a. black b. blue
    c. light brown * d. green.

112. The shelf life of CLR - 33.5 is
    a. 3 months b. 6 months
    c. 9 months * d. 12 months.

113. Tack drying time of CLR - 33.5 is
    a. 5 - 10 minutes * b. 12 - 25 minutes
    c. 25 - 45 minutes d. 1 hour.

114. ------------ is used for covering helicopter MI - 4 tail rotor blades/ propellers with fabric.
    a. CLR - 33.5 * b. Neoprene
    c. Proto seal LX d. Dual mix cement.

115. Which of the following is true for Adhesive Evostik - 528
    a. it is toxic
    b. it is cold setting adhesive
    c. it is uncured epoxy resin
    d. all of these *

116. ------------------- adhesive is used to prepare enamels warnishes, fillers & semifinished product
a. CLR - 33.5 b. Double Mix cement
c. Proto seal LX d. Evostik - 528 *

117. The colour of EVOSTIK is
a. straw yellow * b. sea green
c. navy blue d. peach olive.

118. --------------- is used for bonding metal to rubber, cork, to felt and rubber in aircraft
a. CLR - 33.5 b. Double Mix cement
c. Proto seal LX d. Evostik - 528 *

119. The appearance of Evostik - 528 is
a. homogeneous * b. heterogeneous
c. colloidal solution d. none of these.

120. Which of the following is the weight per litre of the evostik at 26°C
a. 1.5 kg max. b. 1.05 kg max.*
c. 0.005 kg max d. 2.05 kg max.

121. Which of the following is true about CR - RP - 150
a. it is used for gluing rubber by cold methods to metals
b. articles glued by this can be used in sea water
c. glued film retains elasticity
d. all the above *

122. The base type of CR - RP - 150 is
a. neoprene b. poly chloroprene *
c. lanoline d. mortiene.

123. The shelf life of CR - RP - 150 is
a. 3 months * b. 6 months
c. 9 months d. 12 months.

124. --------------- is used for gluing of rubber to metals, glass and to rubber by cold method for structural parts in the assembly line of Mig - 21
a. Lanoline b. CR - RP - 150 *
c. CR - RP - 528 d. CLR - 33.5

125. Which of the following is not a property of nitrocellulose
a. it is the mixture of nitro cellulose & resin in an organic solvent
b. it is used for gluing of different fabrics
c. it is applied by brush on plywood plate with consumption of 0.1 to 0.12 kg/m^2
d. all the above *

126. The nitro cellulose is packed in ------------- plated flasks
a. Cu b. Fe
c. Gold d. Zn *

127. The colour of Nitro cellulose glue is
a. Green b. Red
c. Brown d. Transparent *

128. The shelf life of Nitro cellulose glue is
a. 6 months b. 1 year *
c. 18 months d. 2 years.

129. ------------------ is used as Air drying for thread bandage in MIG Air Craft
a. NBR - RP - 75 b. CR - RP - 150
c. Nitro cellulose * d. Proto seal LX.

130. Which of the following is false for NBR - RP - 75
a. it is a viscous paste
b. it is obtained by dissolving nitrile rubber stock in an organic solvent
c. it is to be used as sealing compound
d. none of the above *

131. NBR - RP - 75 is a
a. Hot setting adhesives
b. cold setting adhesives *
c. catalyst setting adhesives
d. none of the above.

132. The chemical base type of the NBR - RP - 75 is
a. Nitrile type * b. Butyl type
c. Poly chloroprene type d. none of the above.

133. The colour of Adhesive NBR - RP - 75 is
a. Black * b. Brown
c. Blue d. Red.

134. Shelf life of NBR - RP - 75 is
a. 4 months b. 6 months *
c. 8 months d. 12 months.

135. Tack drying time for NBR - RP is
a. 3 to 4 minutes * b. 5 - 7 minutes
c. 8 - 10 minutes d. 11 - 13 minutes.

136. Drying time for NBR - RP - 75 is
a. 10 minutes b. 20 minutes
c. 30 minutes * d. 50 minutes.

137. -------------- is used as sealing compound in pressurized cabin and repair of integral fuel tanks of air craft
a. Primer Self Sealing - 82
b. NBR - RP - 75 *
c. Dual mix cement
d. None of the above.

138. Which of the following is true for Sealant - 82
a. it is dilute solution of natural rubber latex
b. it acts as primer
c. it is self sealing
d. all the above *

139. The colour of sealant - 82 is
a. red b. orange
c. pink * d. blue.

140. The solid content in sealant - 82 by weight is
a. 25% b. 34 - 37%
c. 42% * d. 50%.

141. The shelf life of sealant -82 is
   a. 2 months b. 34 - 37%
   c. 6 months * d. 9 months.

142. Drying time for sealant - 82 is
   a. 1 hr * b. 2 hr
   c. 3 hr d. 5 hr.

143. --------------------- is used for rubberised main fuel tanks for hunter aircraft
   a. Resin ATA - 6 b. Hardener -758
   c. Sealant - 82 * d. None of the above.

144. Epoxy resin ATA - 6 is of base
   a. Bis phenol A b. Epi chloro hydrin
   c. Aliphatic polyamine d. Only a. and b. *

145. Hardener 758 is of base
   a. Bisphenol A b. Epi chloro hydrin
   c. Aliphatic Polyamine * d. Only a. and b.

146. Which of the following is true for Epoxy Resin ATA - 6
   a. it is an uncured epoxy resin
   b. it is brought to infusible and insoluble condition by hardeners
   c. it is used for preparing glues for glass, plastics
   d. all the above *

147. The resin is cured by keeping at Room Temperature for
   a. 4 hrs b. 8 hrs.
   c. 16 hrs * d. 12 hrs.

148. Curing agents for epoxy resins are
   a. low molecular polyamides
   b. poly carboxylic acids
   c. phenol formaldehyde
   d. all the above *

149. This disadvantages of epoxy resins are
   a. vapours liberated while heating the resins cause irritation
   b. it can be dangerous if fallen on skin
   c. it can cause occupational dermatitis and conjunctivitis
   d. all the above *

150. Shelf life of epoxy resin ATA - 6 is
   a. 2 months b. 4 months
   c. 6 months * d. 8 months.

151. Shelf life of hardener 758 is
   a. 4 months b. 8 months
   c. 10 months d. 12 months *

152. ----------------- is used for gluing of anodized duralumin, steel, titanium alloys in different aircrafts
   a. Resin ATA 6 & Hardener - 758 *
   b. Dual mix cement
   c. Sealant - 82
   c. All the above.

153. ----------------- is used for gluing of anodized duralumin & filling up cavities in formed plastic K - 20 and for preparation of glue L - 4
   a. Resin ATA 6 * b. Dual mix sealant
   c. Sealant - 82 d. Proto seal LX

154. NBR - RP - 50 is also called
   a. Rubber glue b. Rubber cement *
   c. Glued cement d. Glued rubber.

155. Which of the following is true about NBR - RP - 50
   a. it is a viscous solution obtained by dissolving synthetic rubber
   b. it is used to glue rubber & rubber fabrics between themselves
   c. the method of gluing used is hot
   d. all the above *

156. The chemical base for NBR - RP - 50 is
   a. nitrile rubber * b. butyl rubber
   c. stryrene rubber d. all the above.

157. Shelf life for NBR - RP - 50
   a. 3 months b. 6 months *
   c. 9 months d. 10 months.

158. ------------------- is used for gluing the rubber fabrics in aircraft fuel tank
   a. NBR - RP - 75 b. NBR - RP - 50 *
   c. Dual mix cement d. none of the above.

159. Which of the following is true for ISA - 0118 (1)
   a. it is used for non critical application *
   b. it is used for structural purpose
   c. it is used for life raft, air ship etc.
   d. all the above.

160. ISA . 0118 (1)
   a. homogeneous * b. heterogenous
   c. collidal d. all.

161. Which of the following is true for ISRO - PN - 1005
   a. it is a glue use as top coat materials
   b. it protects from ozone
   c. its commercial designation is PNR 1005L
   d. all the above *

162. The base type of ISRO - PN - 1008 is
   a. nitrile * b. Butyl
   c. Carboxyl d. Phenyl.

163. The colour of ISRO - PN - 100S is
   a. Red * b. Brown
   c. Pink d. Orange.

164. -------------------- is used as top coat material for fuel tanks of Mig series of air crafts, protecting from ozone
   a. NBR - SP -50 b. ISRO - PN - 1005 *
   c. Lanoline d. All the above.

165. Which of the following is true for sealant RDL 934
   a. it contains polysulphide base compound
   b. it can be applied by extrusion gun.
   c. it can also be applied by spatula
   d. all the above *

166. Non volatile content in sealant RDL 934 (by weight) is
   a. 4% b. 57%
   c. 86% d. 97% *

167. Specific gravity of RDL - 934 is
   a. 0.97 b. 1.65 *
   c. 1.89 d. 2.4.

168. Pot life of RDL - 934 is minimum
   a. 1 hr * b. 2 hrs
   c. 3 hrs d. 4 hrs.

169. Tack free time for RDL -934 is
   a. 10 hrs b. 24 hrs. *
   c. 36 hrs d. 48 hrs.

170. ISRO PN - 15 is a stock solution of base
   a. Nitrite rubber
   b. Resorcinol formaldehyde
   c. Both *
   d. None.

171. The application of ISRO - PN - I5 is done out at
   a. 20 - 30°C & 75% RH *
   b. 40 - 50°C & 75% RH
   c. 60 - 70°C & 60% RH
   d. None of these.

172. The disadvantages of ISRO-PN-I5 is
   a. its vapours are irritative
   b. it catches fire easily
   c. they can cause dermatitis eczema
   d. all the above *

173. Shelf life of ISRO-PN-I5 is minimum
   a. 3 months b. 6 months *
   c. 9 months d. 12 months.

174. Pot life of ISRO-PN-I5 is
   a. 1 hour b. 1.5 hours *
   c. 2 hours d. 2.5 hours.

175. ---------------- is used for gluing metal to rubber
   a. Linoline b. ISRO-PN-I5 *
   c. Cubus - 15 d. Tubepoxy.

176. ISRO-PN-6-18 adhesive is
   a. rubber adhesive
   b. cement adhesive
   c. rubber cement adhesive *
   d. all the above.

177. The method of gluing the ISRO - PN - 6 - 18 is
   a. hot * b. cold
   c. room temperature d. all.

178. The colour of ISRO-PN- 6 - 18 is
   a. Red b. Black
   c. Light Brown * d. Green.

179. The chemical base for ISRO-PN- 6 -18 is
   a. Nitrile * b. SBR
   c. Lanoline d. Neoprene.

180. Shelf life of ISRO-PN- 6 -18 is
   a. 4 months b. 6 months *
   c. 7 months d. 8 months.

181. ---------------- is used for manufacture of flexible fuel tanks of MIG aircraft
   a. ISRO-PN- 6 -18 * b. ISRO-PN- 15
   c. Epoxy d. None of these.

182. Glue ISRO-PN- 32 - 2 is a ------------------- component system
   a. 1 b. 2
   c. 3 * d. 4.

183. Various components of ISRO-PN- 32 - 2 are/is
   a. bakelite varnish b. solution of resols
   c. formaldehyde d. all the above *

184. The base for ISRO-PN- 32 - 2 is
   a. nitrile rubber
   b. resorcinol phenol formaldehyde
   c. both *
   d. none.

185. The disadvantage of ISRO-PN- 32 - 2 is
   a. it is irritating to eyes
   b. it has risk of fire *
   c. it can cause dermatitis
   d. all the above.

186. The pot life of ISRO-PN- 32 - 2 after mixing is
   a. 4 hrs b. 6 hrs
   c. 8 hrs. * d. 1.2 hrs

187. ---------------- is used as the bonding metal for glass wool to metal
   a. ISRO-PN- 32 - 2 * b. ISRO-PN- 6 - 18
   c. ISRO-PN- 15 d. Lanoline.

188. Which of the following is true for ISRO - EP - 1
   a. it is partially polymerized monocarbinol
   b. it is obtained by fractional distillation of carbinol
   c. it is stabilized by adding Age - Rite.
   d. all the above *

189. The base type of ISRO - EP - 1 is
   a. nitrile b. epoxy *
   c. formaldehyde d. phenol

190. The colour of resin is
   a. yellowish brown * b. greenish yellow
   c. brown black d. navy blue.

191. The colour of hardener for ISRO - EP - 1 is
 a. black b. brown *
 c. red d. yellow.

192. The resin of ISRO - EP - 1 is
 a. solid b. liquid *
 c. emulsion d. none.

193. The hardener used in ISRO - EP - 1
 a. liquid b. solid *
 c. emulsion d. none.

194. ------------- is used for gluing glass and other transparent materials with filler cement to metals, plastics & non metals
 a. ISRO - EP -1 * b. ISRO - PN - I5
 c. ISRO - PN - 32 d. ISRO - PN - 6 -18.

195. ISRO - EP - 2 is
 a. phenol polyvinylacetal adhesive *
 b. it is an explosive fluid
 c. it is not used for metals
 d. it cannot be used at low temperatures.

196. ISRO - EP - 2 is used for gluing
 a. metals b. non metals
 c. both * d. none.

197. Operating temperature for ISRO - EP - 2 are
 a. - 60°C to 80°C * b. -5°C to 20°C
 c. -35°C to +35°C d. -15 to 20°C.

198. ISRO - EP - 2 has
 a. grater heat resistance b. lesser elasticity
 c. both * d. none.

199. The ISRO - EP - 2 is
 a. nitrile type b. butyl type
 c. phenolic type * d. none.

200. The colour of ISRO - EP - 2 is
 a. yellow b. light cream *
 c. orange d. blue.

201. Glue ISRO - EP - 2 is preserved in
 a. dry & airtight vessels
 b. tin plated iron or aluminium vessels
 c. the barrels which are closed by wooden stopper
 d. all the above *

202. The disadvantage of ISRO - EP - 2 is
 a. liberation of gaseous substances like phenol, ammonia etc.
 b. less heat resistance
 c. if fallen on skin it can cause dermatitis
 d. all the above *

203. --------------- is used for gluing metal and non metals in structural parts, operating at temperatures between - 50°C and 60°C
 a. ISRO - EP - 32 b. ISRO - EP - 1
 c. ISRO - EP - 2 * d. All of the above.

204. ISRO - EP - 4 is a ------------- part system
 a. 1 b. 2 *
 c. 3 d. 4.

205. ISRO - EP - 4 is formed from
 a. Epoxy * b. Lanoline
 c. Melamine d. All.

206. Shelf life of adhesive ISRO - EP - 4 is
 a. 3 months * b. 6 months
 c. 9 months d. 10 months.

207. Pot life of mixture of ISRO - EP - 4 is
 a. 2 hr b. 3 hr. *
 c. 4 hr d. 6 hr.

208. ---------------- is used as a bonding agent for metal to metal
 a. ISRO - EP - 2 b. ISRO - EP - 1
 c. ISRO - EP - 4 * d. ISRO - PN - 32.

209. GLUE - EP - 40 is
 a. toxic * b. non toxic
 c. hot setting type d. none of these.

210. ISRO - EP - 40 is used to prepare
 a. enamels b. varnishes
 c. fillers d. all the above *

211. The safety and health hazard due to ISROERP - 40 is
 a. exhaust fumes cause irritation to eyes
 b. it is toxic
 c. it can cause dermatitis and collectivities
 d. all the above *

212. The colour of ISRO - EP - 40 is
 a. greenish b. yellowish *
 c. brownish d. reddish.

213. The shelf life of ISRO - EP - 40 is
 a. 6 months * b. 9 months
 c. 1 year d. 15 months.

214. Pot life of glues ISRO - EP - 40 is
 a. 1 hr. minimum * b. 2 hr. min
 c. 3 hr. minimum d. none of these.

215. ------------------ is used to glue anodizing duralumin, steel and titanium alloys between alloys between themselves.
 a. ISRO - E - 1 b. ISRO - EP - 2
 c. ISRO - EP - 32 d. ISRO - EP - 40. *

216. Which of the following is true for Glue ISRO - NR - 7
 a. it is a primer
 b. it is a dilute solution of high molecular weight resin
 c. it establishes strong & moisture resistant interfacial bond
 d. all the above.*

217. The colour of component A of ISRO - NR- 7 is
a. light gray * b. pale yellow
c. yellowish brown d. greenish brown.

218. The colour of component B of ISRO - NR - 7 is
a. light gray b. pale yellow *
c. yellowish brown d. chocolate brown.

219. The shelf life of ISRO - NC - 7 is
a. 3 months b. 6 moths *
c. 9 months d. 10 months.

220. -------------- is used in flexible fuel tank as a ozone resistant primer coat
a. ISRO - RP -01 b. ISRO - NR - 7 *
c. ISRO - RP - 02 d. ISRO - RP - 32.

221. The chemical base of ISRO - NE - 20 is
a. Lanoline b. Epoxy
c. Nitro cellulose * d. Nitro butane.

222. Commercial designation of ISRO - NC - 20 is
a. AK 20 * b. NL - 50
c. AK 25 d. None.

223. Which of the following is true for ISRO - NR - 7 ?
a. it is a dilute solution of high molecular weight resin
b. it establishes strong & moisture resistant interfacial bond.
c. it protects the surface from hydration & corrosion
d. all the above *

224. The colour of component A in ISRO - NR - 7 is
a. light gray * b. blue
c. orange d. pale yellow.

225. The colour of component B in ISRO - NR - 7 is
a. light gray b. pale yellow *
c. blue d. orange.

226. Shelf life of ISRO - NR - 7
a. 3 months b. 6 months *
c. 9 months d. 10 months.

227. -------------------- is used in flexible fuel tank as a ozone resistant primer coat.
a. ISRO - NR - 2 b. ISRO - NR - 32
c. ISRO - NR - 7 * d. None of these.

228. RDL - 840 B
a. is two part system
b. contains polysulphide base compound
c. is used for application either by extrusion gun or spatula
d. all of the above *

229. None volatile contents in RDL - 840 B by weight
a. 65% minimum b. 75% minimum
c. 92% minimum * d. 97% minimum .

230. The tack free time for RDL - 840 B is
a. 20 hrs maximum b. 30 hrs maximum
c. 40 hrs maximum * d. none of these.

231. ---------------- is used for sealing of aircraft components
a. ISRO - NR - 70 b. ISRO - NR - 32
c. RDL - 840 B * d. none of the above.

232. The component of Glue K - 300 - 61 (1) is
a. Resin b. Hardener
c. Titanium dioxide * d. None.

233. Pot life of Glue K - 300 - 61 (1) is
a. ½ hours b. 1 hours *
c. 1½ hours d. 2 hours.

234. ---------------- is used for the interfaces of non - return values and gear inner groove of oil units assembly of R - 25 engine
a. NR - 70 b. NR - 32
c. RDL - 840 B * d. None.

235. ----------------- is a viscous rubber cement obtained by dissolving the synthetic base rubber stock in an organic solvent with appropriates
a. NR - 70 b. ISRO - NR - 32
c. ISRO - PN - 4 - 18 B * d. None of the above.

236. The base of Adhesive ISRO - PN - 4 - 18 B is
a. Nitrile * b. SBR
c. Lanoline d. Turpentile.

237. The colour of ISRO - PN - 4 - 18 B (MODI) is
a. Brown b. Brown - Black
c. Black * d. None.

238. The visual properties of ISRO - PN - 4 - 18 B is/are
a. Homogeneous b. Viscous liquid
c. Both * d. None .

239. Shelf life of PN - 4 - 18 B is
a. 4 months b. 6 months *
c. 8 months d. 12 months.

240. ---------------- is used for bonding the nitrile rubber to rubberized fabric in flexible fuel tank
a. ISRO - PN - 4 - 18 B * b. ISRO - PN - 32
c. ISRO - PN - 70 d. ISRO - PN - 2.

241. Which of the following is true about glue NK - VKR - 16
a. it is a resin
b. it is the product of polymerization condensation
c. it is used for fabrication of viscous elasticcomposition
d. all the above *

242. The chemical base type of component A of VKR - 16 is
a. nitrile rubber * b. phenolic resin
c. benzene alcohol d. lanoline.

243. The chemical base type of component B of VKR - 16 is
a. nitrile rubber b. phenolic resin *
c. benzene alcohol d. lanoline.

244. Which of the following is disadvantage of VKR - 16
a. it is fine explosive.
b. if heated upto 150°C, ammonia gets liberated *
c. it can cause damage to ears
d. all the above.

245. The glue NK - VKR -16 is preserved at
a. 25°C, Relative Humidity 75% *
b. 50°C RH 90%
c. 3°C , RH 20%
d. 27°C RH 100%.

246. The colour of component A of VKR - 16 is
a. brown b. black *
c. blue d. yellow.

247. The colour of component B of VKR - 16 is
a. dark reddish * b. dark brown
c. dark yellow d. black.

248. The shelf life of VKR - 16 is
a. 4 moths b. 6 months *
c. 8 months d. 12 months.

249. The pot life of VKR - 16 is
a. 2 hrs b. 4 hrs
c. 6 hrs. * d. 10 hrs.

250. ---------------------- is used for bonding of vulcanized nitrile base rubber to metallic parts working at -50°C to 120°C in different climatic conditions.
a. VKT - 2 b. UKT - 10
c. VKR - 16 * d. NR - 32.

251. Which of the following is not true for VKT - 2
a. it is a heat resistant glue
b. it is a solution of varnish - KO - 916 & polybutyl metacrylate
c. it is intended for gluing rubber to rubber *
d. none of these.

252. The chemical base type of glue SL - VKT - 2 is
a. nitrile base b. rubber cement
c. butyl d. resin *

253. Which of the following is disadvantage of VKT - 2
a. it is toxic
b. prolonged inhalation of vapours cause giddiness
c. vapours can cause irritation of skin
d. all the above *

254. The glue SL - VKT - 2 is stored in -------------------- containers
a. aluminium b. galvanized containers
c. either a. or b.* d. plastic.

255. The glue SL - VKT - 2 is stored at temperature of
a. 5 - 25°C * b. 35 - 50°C
c. 65 - 75°C d. below 5°C.

256. The colour of VKT - 2 is
a. yellow to dark brown * b. brown to black
c. dark gray to black d. none of these.

257. --------------------- is used for gluing fibre glass thermal insulating materials to stainless and titanium alloys
a. VKT - 2 * b. VKR - 60
c. UK - RP - 15 d. CR - RP - 15.

258. Which of the following is true for CR - RP - 15
a. it is used for gluing vulcanized rubbers
b. it is prepared by mixing chlopre with benzene & ethyl acetate
c. these are kept at a distance of more than 1.5 m from heating appliances.
d. all the above *

259. The chemical base type of CR - RP - 15 is
a. nitrile b. resin
c. chloroprene * d. lanoline.

260. The colour of CR - RP - 15 is
a. Brownish b. light greenish *
c. pale yellowish d. black.

261. -------------------- is used for gluing vulcanized rubbers and rubberized fabric materials
a. VKT - 2 b. CR - RP - 15 *
c. VKR - 16 d. Ana bond 673.

262. Which of the following is true for Anabond 673
a. it is a room temperature vulcanizing silicon sealant
b. it is a single pack system
c. it is used directly on the component without use of primer P-11 and catalyst
d. all the above *

263. The chemical base type of Anabond 673 is
a. nitrile b. silicon *
c. butyl d. lanoline.

264. The specific gravity of anabond 673 is
a. 1.25 b. 1.45 *
c. 2.6 d. 3.1.

265. The shelf life of Anabond 673 is
a. 4 months b. 6 months
c. 8 months * d. 10 months.

266. Sealant Anabond 673 is
a. solid b. liquid
c. paste * d. colloidal solution.

267. Inlet guide vanes of R - 25, R - 29 series engines and compressor blade assembly uses ------------------
a. VKR - 16 b. VKT - 2
c. Anabond 673 * d. Tech seal RDL - 840.

268. Which of the following is true about Tech seal RDL - 840
a. it is a two component polysulphide elastomers
b. it can be used as spatula variant as well as brushing variant
c. it is used without any underlayer
d. all the above *

269. The chemical base for Techseal RDL - 840 is
a. nitrile
b. butyl
c. polysulphide elastomer *
d. none of the above.

270. The colour of base of Tech seal RDL - 840 is
a. dark brown * b. black
c. blue d. grey.

271. The colour of accelerator for RDL - 840 is
a. dark brown to black * b. blue
c. gray d. orange.

272. The setting time required for RDL - 840 is
a. 10 hrs. b. 15 hrs.
c. 24 hrs. * d. 28 hrs.

273. The shelf life of polymer paste of RDL - 840 is
a. 3 months * b. 6 months
c. 8 months d. 10 months.

274. The shelf life of curing paste of RDL - 840 is minimum
a. 3 months b. 6 months *
c. 8 months d. 12 months.

275. --------------------- is used for sealing of bolted, rivetted and other metallic (Al) joints or couplings, working in air media from -60°C to 150°C
a. VKT - 2 b. VKR - 7
c. RDL - 840 * d. PU - 2.

276. Which of the following is true about glue PU - 2
a. it is a semi solid two component system
b. it contains polyester base with organic solvent in tolune
c. it is to be kept under pressure for 5 hrs.
d. all the above *

277. The chemical base type of component A of PU - 2 is
a. polyester base * b. nitrile base
c. butyl base d. SBR base.

278. The chemical base of component B of PU - 2 is
a. polyester base
b. toluene - di - ISO cyanate *
c. butyl base
d. SBR base.

279. The colour of PU - 2 is
a. black b. white *
c. peach d. green.

280. The shelf life of PU - 2 is
a. 4 months b. 6 months *
c. 8 months d. 10 months.

281. Pot life of PU - 2 is
a. 1 hr b. 2 hr *
c. 3 hr d. 4 hr.

282. ----------------- is used for gluing edge strip to main rotor blade of MI - 8 helicopter and other patch repairs
a. VKR - 7 b. VKT - 2
c. PU 2 * d. SL - KR - 5 - 18.

283. Which of the following is true for SL - KR - 5 - 18
a. it is a rubber cement
b. it is a viscous solution
c. these are used for gluing by cold methods
d. all the above *

284. The colour of part A of SL - KR - 5 - 18 is
a. blue b. black *
c. brown d. gray.

285. The colour of part B of SL - KR - 5 - 18 is
a. blue b. black
c. brown * d. gray.

286. Pot life of Part A of SL - KR - 5 - 18 is
a. 4 hrs b. 8 hrs
c. 12 hrs. * d. 16 hrs.

287. Shelf life of part A of SL - KR - 5 - 18 is
a. 3 months * b. 6 months
c. 8 months d. 9 months.

288. Shelf life of part B of SL - KR - 5 - 18 is
a. 3 months * b. 6 months
c. 8 months d. 10 months.

289. ------------------ is used for gluing of rubber to metals glass to rubber by cold methods for parts in assembly line of Mig 21
a. SL - KR - 5 - 18 * b. PR - 2
c. VKT - 2 d. HAL 1838 B/A.

290. Which of the following is true for HAL 1838 B/A
a. it is uncured epoxy system
b. it is brought to infusible and insoluble condition by hardener
c. it is homogeneous paste
d. all the above *

291. HAL 1838 B/A is prepared by mixing resin and hardener in the ratio of
a. 1 : 1 b. 1.4 : 1 *
c. 1.5 : 1.6 d. 2 : 1.

292. ------------------ is used for gluing of metal to metal in Cheetah /Chetak helicopters
a. PU - 2 b. VKT - 7
c. VKR - 2 d. HAL 1838 B/A *

293. Which of the following is true about Glue VG - 1
 a. it is viscous solution of rubber stock
 b. it makes ozone proof coating
 c. it is equivalent to Russian glue BPC - 8
 d. all the above *

294. The chemical base of VG - 1 is
 a. fluoro elastomer * b. polyvinyl sulphide
 c. rubber resin d. epoxy

295. The colour of VG - 1 is
 a. black * b. brown
 c. green d. red.

296. Shelf life of VG - 1 is
 a. 3 months b. 6 months *
 c. 8 months d. 10 months.

297. Pot life of VG - 1 is
 a. 1 hour * b. 2 days
 c. 3 months d. 4 years.

298. ---------------------- is used for light and ozone proof coating to rubber and rubberized components i.e. flexible fuel tanks
 a. VKT - 7 b. PU - 2
 c. VG - 1 * d. AY - 103.

299. Which of the following is true for AY - 103 & HY 951
 a. it is a two pack epoxy adhesives
 b. the strong bonds are obtained
 c. it is used in both heavy and light industries
 d. all the above *

300. The chemical base of AY 103 & HY 951 is
 a. SBR b. Butyl
 c. Lanoline d. Epoxy *

301. The colour of AY 103 & HY - 951 is
 a. colourless b. yellow
 c. either a. or b. * d. green.

302. Which of the following is property for AY - 103 & HY 951
 a. it is viscous
 b. it is transparent
 c. it has no mechanical impurities *
 d. none.

303. Shelf life of AY - 103 & HY 951 is
 a. 3 months b. 6 months *
 c. 9 months d. 12 months.

304. Pot life of AY - 103 & HY 951 is
 a. 1 hr b. 1.5 hr *
 c. 2 hr d. 2.5 hr.

305. SL - 4N BUV is
 a. rubber glue
 b. suitable for all climatic condition
 c. used for vulcanized rubbers
 d. all the above *

306. The base for SL - 4N - BUV is
 a. epoxy b. formaldehyde
 c. chloroprene * d. butyl.

307. Shelf life of SL - 4N BUV is
 a. 3 months * b. 6 months
 c. 8 months d. 10 months.

308. ------------------ is used for vulcanized rubbers & rubber fabrics without subsequent hot vulcanization
 a. 1 SBR b. VKT - 2
 c. SL - 4N BUV * d. PU - 2.

309. SL - 51 - K - 15/1 is
 a. viscous rubber cement
 b. obtained from fluorocarbon based rubber stock.
 c. it is preserved in collapsible tubes
 d. all the above *

310. The base type for glue SL - 51 - K - 15/1 is
 a. chloroprene b. fluoro carbon *
 c. butyl d. green.

311. The Glue SL - 51 - K - 15/1 is preserved at
 a. 25°C - 30°C * b. 40°C - 50°C
 c. 60°C- 70°C d. 80°C - 90°C.

312. The colour of component A is
 a. black * b. brown
 c. green d. colourless.

313. The colour of component B is
 a. black b. brown
 c. green d. colourless *

314. The pot life of component A of SL - 51 - K - 15/1 is
 a. 1 hr b. 2 weeks
 c. 3 months * d. 4 years.

315. ------------------ is used for gluing the fluoro carbon based rubber for aircraft application such as rubber to metal & rubber to rubber
 a. PU - 2 b. SL - 51 - K - 15/1 *
 c. Lanoline d. None.

316. Which of the following is true for RDL - 945
 a. it is hermatically packing black colour material of pasty consistency
 b. it is used as sealant without any underlayer
 c. it can be used for bolted & rivetted joints
 d. all the above *

317. RDL - 945 is used at the temperature range of
 a. -15°C to 25°C b. - 60° to 150°C *
 c. - 150°C to 25°C d. None of these.

318. The chemical base for RDL - 945 is
 a. polysulphide elastomers *
 b. lanoline
 c. butyl d. nitrile.

319. The pot life of RDL 945 is
a. 2 minutes * b. 3 hours
c. 4 days d. 5 weaks.

320. -------------------- is used for hermatically sealing of aircraft canopies
a. SL - LK - 15 b. PU - 1
c. RDL 945 * d. SL - VK - 3.

321. RDL 945 is stored at
a. 0 - 25°C ; RH 59 - 85% * b. 0 - 25°C ; RH > 90%
c. - 15°C ; RH 59 - 85% d. - 15°C ; RH = 95%.

322. Which of the following is true about SL - VK - 3
a. it is a rubber cement adhesive
b. it is viscous and homogeneous solution
c. it is obtained by dissolving the synthetic base rubber stock in organic solvent
d. all the above *

323. The chemical base of SL - VK - 3 of component A is
a. nitrile rubber * b. sulphur powder
c. phenol formaldehyde d. butyl rubber.

324. The chemical of component B of SL - VK - 3 is
a. nitrile rubber b. sulphur powder
c. phenol formaldehyde d. butyl rubber.*

325. The chemical base of Component C of SL - VK - 3 is
a. nitrile rubber b. sulphur powder
c. phenol formaldehyde * d. butyl rubber.

326. --------------------- is used for fabrication of honey comb structures
a. SL - KR - 5 - 18 b. SL - VK - 3 *
c. RDL - 945 d. VG - 1.

327. Which of the following is true for Epoxy Adhesive HAL - 2216 B/A
a. it is an uncured epoxy
b. it is brought to infusible condition by action of hardeners
c. it mainly used for bonding metal to metal
d. all the above *

328. The Pot life HAL 2216 B/A is
a. 60 minutes b. 90 minutes
c. 120 minutes * d. 150 minutes.

329. Which of the following is true about Dunlop 5758 is
a. it is a Neoprene based adhesive
b. it is a viscous solution obtained by dissolving Neoprene in an organic solvent
c. it is mainly used for gluing metal to cotton duck
d. all the above *

330. Which of the following is true about ARALDITE AV 138/HV 998
a. it is a two pack epoxy adhesive
b. it is resistant to heat and chemicals upto 120°C
c. it is cured at temperature down to 5°C
d. all the above *

331. The strength and durability of the bonded joint by Araldite AV 138 is
a. Excellent
b. Poor
c. Dependent on the proper pretreatment of the surfaces *
d. none of these.

332. The chemical base of Araldite AV 138 is
a. modified bisphenol A *
b. polyamine
c. nitrile
d. SBR.

333. The chemical base for hardener HV 998 is
a. modified bisphenol A
b. polyamine *
c. nitrile
d. SBR.

334. Araldite AV 138/ HV 998 is stored at
a. 5 - 10°C b. 10 - 14°C
c. 18 - 25°C * d. 60 - 70°C,

335. ---------------- is used in stator core of unit DID - 0.55
a. Araldite AV 138 / HV 998 *
b. VG - 1
c. SL - VK - 3
d. RDL - 945.

336. ------------------- is used in RSF - 55 B (metring valve) of fuel system of MIG 27 Aircraft
a. Araldite AV 138 * b. Araldite AV - 138 M
c. RDL - 945 d. SL - VK - 3.

■■■

CHAPTER - 106
ENGINEERING MATERIALS (MISCELLANEOUS)

1. Ductility of a material can be defined as
   a. ability to undergo large permanent deformations in compression
   b. ability to recover its original form.
   c. ability to undergo large permanent deformations in tension.*
   d. all of the above.
   e. none of the above.

2. Malleability of a material can be defined as
   a. ability to undergo large permanent deformations in compression *
   b. ability to recover its original forms
   c. ability to undergo large permanent deformations in tension
   d. all of the above.
   e. none of the above.

3. In compression, a prism of brittle material will break
   a. by forming a bulge.
   b. by shearing along oblique plane.*
   c. in direction perpendicular to application of load.
   d. by crushing into thousands of pieces
   e. none of the above.

4. The ability of a material to resist softening at high temperature is known as
   a. creep
   b. hot tempering
   c. hot hardness *
   d. fatigue
   e. superhardening

5. Mild steel belongs to the following category
   a. low carbon steel *
   b. medium carbon steel
   c. high carbon steel
   d. alloy steel
   e. special steel

6. The ultimate tensile strength of low carbon steel by working at a high strain rate will
   a. decrease
   b. increase *
   c. remain constant
   d. first increase and then decrease
   e. first decrease and then increase

7. Slow plastic deformation of metals under a constant stress is known as
   a. creep *
   b. fatigue
   c. endurance
   d. plastic deformation
   e. non-plastic deformation

8. The ultimate tensile strength and yield strength of most of the metals, when temperature falls from 0 to -150^{0}C will
   a. increase *
   b. decrease
   c. remain same
   d. first increase and then decrease

9. The number of electrons in 1 cm^3 of metal would be of the order of
   a. 10^{10}
   b. 10^{16}
   c. 10^{22} *
   d. 10^{40}
   e. 10^{52}

10. Stress relaxation is the phenomenon
    a. in which parts are not loaded
    b. in which stress remains constant on increasing load.
    c. in which deformation tends to loosen the joint and produces a stress reduction.*
    d. stress reduces on increasing load
    e. none of the above

11. The elastic stress strain behaviour of rubber is
    a. linear
    b. non-linear *
    c. plastic
    d. no fixed relationship
    e. unpredictable behaviour

12 Isotropic materials are those which have the same
    a. elastic properties in all directions.*
    b. stresses induced in all directions.
    c. thermal properties in all directions.
    d. electric and magnetic properties in all directions.
    e. density throughout.

13. Recrystallization temperature is one
    a. at which crystals first start forming from molten metal when it is cooled
    b. at which new spherical crystals first begin to form the old deformed one when a strained metal is heated.*
    c. at which change of allotropic form takes place.
    d. at which crystals grow bigger in size
    e. at which crystals are destroyed on heating.

14. Points of arrest for iron correspond to
    a. stages at which allotropic forms change *
    b. stages at which further heating does not increase temperature for some time.
    c. stages at which properties do not change with increase in temperature.
    d. there is nothing like points of arrest
    e. none of the above

15. Delta iron occurs at temperature of
    a. room temperature.
    b. above melting point.
    c. between 1400^{0}C and 1539^{0}C *
    d. between 910^{0}C and 1400^{0}C
    e. none of the above

16. A material is known as allotropic or polymorphic if it
    a. has a fixed structure under all conditions.
    b. exists in several crystal forms at different temperatures *
    c. responds to heat treatment
    d. has its atoms distributed in a random pattern
    e. none of the above

17. Super conduction by metal is observed in the temperature range of
    a. below 10^{0}K *
    b. above 10^{0}K
    c. around 0^{0}C
    d. around 100^{0}C
    e. above 1000^{0}C

18. Which of the following constituents of steels is softest and least strong
    a. austenite
    b. pearlite
    c. ferrite *
    d. cementite
    e. bainite

19. Which of the following represents the allotropic forms of iron
    a. alpha iron, beta iron and gamma iron
    b. alpha iron and beta iron
    c. body centred cubic α-iron and face centred cubic α-iron.
    d. alpha iron, gamma iron and delta iron *
    e. none of the above

20. The following types of materials are usually the most ductile
    a. face-centred cubic lattice *
    b. body-centred cubic lattice
    c. hexagonal close-packed lattice
    d. all of the above
    e. none of the above

21. Pure iron is the structure of
    a. ferrite *
    b. pearlite
    c. austenite
    d. ferrite and cementite
    e. ferrite and pearlite

22. The temperature at which ferromagnetic alpha iron transforms to paramagnetic alpha iron is
    a. 770^{0}C *
    b. 910^{0}C
    c. 1050^{0}C
    d. below recrystallisation temperature
    e. above recrystallisation temperature

23. Gamma iron exists at following temperature
    a. room temperature
    b. near melting point
    c. between 1400^{0}C and 1539^{0}C
    d. between 910^{0}C and 1400^{0}C *
    e. none of the above

24. Ferromagnetic alpha iron exists in temperature range of
    a. below 723^{0}C *
    b. 770-910^{0}C
    c. 910-1440^{0}C
    d. 1400-1539^{0}C
    e. above 1539^{0}C

25. Paramagnetic alpha iron changes to gamma iron at
    a. 770^{0}C
    b. 910^{0}C *
    c. 1440^{0}C
    d. 1539^{0}C
    e. none of the above

26. A reversible change in the atomic structure of steel with corresponding change in the properties is known as
    a. molecular change
    b. physical charge
    c. allotropic change *
    d. solidus change
    e. atomic change

27. The molecules in a solid move
    a. in a random manner
    b. in a haphazard way
    c. in circular motion
    d. back and forth like tiny pendulums *
    e. do not move

28. The crystal structure of gamma iron is
    a. body centred cubic
    b. face centred cubic *
    c. hexagonal close packed
    d. cubic structure
    e. orthorhombic crystal

29. The crystal of alpha iron is
    a. body centred cubic *
    b. face centred cubic
    c. hexagonal close packed
    d. cubic structure
    e. orthorhombic crystal

30. The metallic structure of mild steel is
    a. body centred cubic *
    b. face centred cubic
    c. hexagonal close packed
    d. cubic structure
    e. orthorhombic crystal

31. For all allotropic forms of iron, the points of arrest are
    a. the points where no further change occurs
    b. constant for all metals
    c. the points where there is no further flow of metal
    d. the points of discontinuity *
    e. the points where major changes take place.

32. The percentage of carbon in pig iron varies from
    a. 0.1 to 1.2%
    b. 1.5 to 2.5%
    c. 2.5 to 4%
    d. 4 to 4.5% *
    e. 4.5 to 6.3%

33. The percentage of carbon in grey iron castings usually varies between
    a. 0.5 to 1%
    b. 1-2%
    c. 2.5 to 4.5% *
    d. 5-7%
    e. 7-9%

34. Pig iron is the name given to
    a. raw material for blast furnace
    b. product of blast furnace made by reduction of iron ore *
    c. iron containing huge quantities of carbon
    d. iron in molten form in the ladles
    e. iron scrap.

35. The unique property of cast iron is its high
    a. malleability
    b. ductility
    c. surface finish
    d. damping characteristics *
    e. hardness

36. Cast iron is characterised by minimum of following % age of carbon
    a. 0.2%
    b. 0.8%
    c. 1.3%
    d. 2% *
    e. 6.3%

37. In grey cast iron, carbon is present in the form of
    a. cementite
    b. free carbon
    c. flakes *
    d. spheroids
    e. nodular aggregates of graphite

38. In nodular iron graphite is in the form of
    a. cementite
    b. free carbon
    c. flakes
    d. spheroids *
    e. nodular aggregates of graphite.

39. In malleable iron, carbon is present in the form of
    a. cementite
    b. free carbon
    c. flakes
    d. spheroids
    e. nodular aggregates of graphite.*

40. Wrought iron is
    a. hard
    b. high in strength
    c. highly resistant to corrosion *
    d. heat treated to change its properties
    e. least resistant to corrosion

41. Sulphur in pig iron tends to make it
    a. hard *
    b. soft
    c. ductile
    d. tough
    e. malleable

42. Pick up wrong statement about wrought iron
    a. it contains carbon of the order of 0 to 0.25%
    b. it melts at 1535^{0}C
    c. it is very soft and ductile
    d. it can be easily forge welded
    e. it is made by adding suitable percentage of carbon to molten iron and subjected the product to repeated hammering and rolling.*

43. Iron is
    a. paramagnetic
    b. ferromagnetic *
    c. ferroelectric
    d. dielectric
    e. none of the above

44. A reversible change in the atomic structure of the steel with a corresponding change in the properties is known as
    a. allotropic change *
    b. recrystallisation
    c. heat treatment
    d. precipitation
    e. austempering

45. Chilled cast iron has
    a. no graphite *
    b. a very high percentage of graphite
    c. a low percentage of graphite
    d. graphite as its basic constituent of composition
    e. none of the above is true

46. Cast iron has
    a. high tensile strength
    b. its elastic limit close to the ultimate breaking strength *
    c. high ductility
    d. all of the above
    e. none of the above

47. White cast iron contains in the form of
    a. free carbon
    b. graphite
    c. cementite *
    d. white carbon
    e. ferrite

48. In mottled cast iron, carbon is available in
    a. free form
    b. combined form
    c. nodular form
    d. flat form
    e. partly in free and party in combined state *

49. An important property of high silicon (12-18%) cast iron is the high
    a. tenacity
    b. brittleness
    c. plasticity
    d. corrosion resistance
    e. hardness *

50. An important property of malleable cast iron in comparison to grey cast iron is the high
    a. compressive strength
    b. ductility *
    c. carbon content
    d. hardness
    e. surface finish

51. Steel contains
    a. 80% or more iron
    b. 50% or more iron *
    c. alloying elements like chromium, tungsten nickel and copper
    d. elements like phosphorus, sulphur and silicon in varying quantities
    e. high quantities of sulphur

52. Carbon steel is
    a. made by adding carbon in steel
    b. refined from cast iron
    c. an alloy of iron and carbon with varying quantities of phosphorus and sulphur *
    d. extensively used for making cutting tools
    e. extremely brittle

53. Annealing of white cast iron results in production of
    a. malleable iron * b. nodular iron
    c. spheroidal iron d. grey iron
    e. none of the above

54. 'Killed steels' are those steels
    a. which are destroyed by burning
    b. which after their destruction are recycled to produce fresh steel.
    c. which are deoxidised in the ladle with silicon and aluminium *
    d. in which carbon is completely burnt
    e. which have poor properties due to improper manufacturing.

55. Hardness of steel depends on
    a. amount of carbon it contains
    b. the shape and distribution of the carbides in iron*
    c. method of fabrication
    d. contents of alloying elements
    e. the quality of ore from which it is made

56. Maximum percentage of carbon in ferrite is
    a. 0.025% * b. 0.06%
    c. 0.1% d. 0.25%
    e. 0.8%

57. Maximum percentage of carbon in austenite is
    a. 0.025%
    b. 0.26%
    c. 0.8%
    d. 1.25%
    e. 1.7% *

58. Corrosion resistance of steel is increased by addition of
    a. chromium and nickle *
    b. sulphur, phosphorus, lead
    c. vanadium, aluminium
    d. tungsten, molybdenum, vanadium, chromium
    e. zinc

59. In which of the follwoing cases, consideration of creep is important
    a. flywheel of steam engine
    b. cast iron pipes
    c. cycle chains
    d. gas turbine blades *
    e. piston I.C. engine

60. The most effective inhibitor of grain growth, when added in small quantities is
    a. carbon
    b. vanadium *
    c. manganese
    d. cobalt
    e. copper

61. Depth of hardness of steel is increased by addition of
    a. nickle
    b. chromium *
    c. tungsten
    d. vanadium
    e. all of the above

62. Railway rails are normally made of
    a. mild steel
    b. alloy steel
    c. high carbon *
    d. tungsten steel
    e. cast iron steel

63. Pick up the wrong statement
    a. aluminium in steel results in excessive grain growth*
    b. manganese in steel induces hardness
    c. nickle and chromium in steel help in raising the elastic limit and improve the resilience and ductility
    d. tungsten in steels improves magnetic properties and hardenability
    e. sulphur, phosphorous and lead improve machining properties of steel.

64. Pick up the wrong statement
Nickle and chromium in steel help in
a. providing corrosion resistance
b. improving machining properties *
c. providing high strength at elevated temperatures
d. raising the elastic limit
e. improving the resilience and ductility

65. Machining properties of steel are improved by adding
a. sulphur, lead, phosphorous *
b. silicon, aluminium, titanium
c. vanadium, aluminium
d. chromium, nickle
e. lubricants

66. Eutectoid steel contains following percentage of carbon
a. 0.02%
b. 0.3%
c. 0.63%
d. 0.8% *
e. 1.2%

67. The basic constituents of Hastelloy are
a. aluminium, copper etc.
b. nickle, molybdenum etc.*
c. nickle, copper etc.
d. all of the above
e. none of the above

68. Basic constituents of Monel metal are
a. nickle, copper *
b. nickle, molybdenum
c. zinc, tin, lead
d. nickle, lead and tin
e. none of the above

69. German silver is an alloy of
a. silver and some impurities
b. refined silver
c. nickel, copper and zinc *
d. nickle and copper
e. silver and gold

70. Surveying tapes are made of a material having low coefficient of expansion and enough strength. The alloy used is
a. silver metal
b. duralumin
c. Hastelloy
d. monel metal
e. invar *

71. A cold chisel is made of
a. mild steel
b. cast iron
c. H.S.S.
d. high carbon *
e. german silver

72. An engineer's hammer is made of
a. cast iron
b. forged steel
c. mild steel
d. high carbon steel *
e. H.S.S.

73. Inconel is an alloy of
a. nickle, chromium and iron *
b. nickle, copper
c. nickle, chromium
d. nickle, zinc
e. nickle, lead

74. By severely deforming a metal in a particular direction it becomes
a. ductile
b. malleable
c. homogeneous
d. isotropic
e. anisotropic *

75. Solder is an alloy consisting of
a. tin, antimony, copper
b. tin and copper *
c. tin and lead
d. lead and zinc
e. lead and copper

76. Cyaniding is the process of
a. dipping steel in cyanide bath
b. reacting steel surface with cyanide salts
c. adding carbon and nitrogen by heat treatment of steel to increase its surface hardness *
d. obtaining cyanide salts
e. making corrosion resistant steel

77. Induction hardening is the process of
a. hardening surface of workpiece to obtain hard and wear resistant surface *
b. heating and cooling rapidly
c. increasing hardness throughout
d. inducing hardness by continuous process
e. hardening core

78. The loss of strength in compression with simultaneous gain in strength in tension due to overloading is known as
a. hysteresis
b. creep
c. visco elasticity
d. Boeschinger effect *
e. inelasticity

79. Process of austempering results in
a. formation of bainite structure *
b. carburised structure
c. martenistic structure
d. lamellar layers of carbide distributed throughout the structure
e. relieving of stresses throughout a component.

80. The surface hardness of the following order is achieved by nitriding operation
  a. 600 VPN
  b. 1500 VPN
  c. 1000 to 1100 VPN *
  d. 250 VPN
  e. 2000 VPN

81. Hardness of martensite is about
  a. RC 65 *
  b. RC 48
  c. RC 57
  d. RC 80
  e. RC 32

82. Weld decay is the phenomenon found with
  a. cast iron
  b. mild steel
  c. non-ferrous materials
  d. wrought iron
  e. stainless steel *

83. Materials after cold working are subjected to following process to relieve stresses
  a. hot working
  b. tempering
  c. normalising
  d. annealing *
  e. special heat treatment

84. Hardness of upper bainite (acicular structure) is about
  a. RC 65
  b. RC 48 *
  c. RC 57
  d. RC 80
  e. RC 32

85. Carbon in iron is an example of
  a. substitutional solution
  b. interstitial solid solution *
  c. intermetallic compounds
  d. all of the above
  e. none of the above

86. Brass (alloy of copper and zinc) is an example of
  a. substitutional solution *
  b. interstitial solid solution
  c. intermetallic compounds
  d. all of the above
  e. none of the above

87. Which is false statement about annealing. Annealing is done to
  a. relieve stresses
  b. harden steel slightly *
  c. improve machining characteristic
  d. soften material
  e. pemit further cold working

88. Argentite is the principal ore or raw material for
  a. aluminium
  b. tin
  c. zinc
  d. lead
  e. silver *

89. Hardness of lower bainite (tempered martensite) is about
  a. RC 65
  b. RC48
  c. RC 57 *
  d. RC 80
  e. RC 32

90. Sphalerite is the principle ore or raw material for
  a. zinc *
  b. silver
  c. tin
  d. magnesium
  e. copper

91. Which is false statement about normalising. Normalising is done to
  a. refine grain structure
  b. reduced segregation in casting
  c. improve mechanical properties
  d. induced stresses *
  e. relieve internal stresses

92. Vanadium in high speed steels
  a. promotes decarbonisation
  b. provides high hot hardness
  c. forms very hard carbides and thus increases wear resistance *
  d. promotes retention of austenite
  e. increases toughness

93. Amorphous material is one
  a. in which atoms align themselves in a geometric pattern upon solidification
  b. in which there is no definite atomic structure and atoms exist in a random pattern just as in a liquid *
  c. which is not attacked by phosphorous
  d. which emits fumes on melting
  e. none of the above

94. Dislocations in materials refer to the following type of defect
  a. point defect
  b. line defect *
  c. plane defect
  d. volumetric defect
  e. chemical defect

95. An example of amorphous material is
  a. zinc
  b. lead
  c. silver
  d. glass *
  e. brass

96. Which is false statement about tempering. Tempering is done to
  a. improve machinability *
  b. improve ductility
  c. improve toughness
  d. release stresses
  e. reduce hardness and brittleness

97. Which is the false statement about case hardening. Case hardening is done by
    a. electroplating *
    b. cyaniding
    c. induction hardening
    d. nitriding
    e. flame hardening

98. Which is the following is the binding material in cemented carbides
    a. cobalt *
    b. nickle
    c. vanadium
    d. iron
    e. carbon

99. Chromium in steel
    a. improves wear resistance, cutting ability and toughness *
    b. refines grain size and produces less tendency to carburisation, improves corrosion and heat resistance properties
    c. improves cutting ability and reduces hardenability
    d. given ductility, toughness, tensil strength and anticorrosion properties
    e. makes steel hard

100. Manganese in steel increases its
    a. tensile strength *
    b. hardness
    c. ductility
    d. fluidity
    e. malleability

101. Cemented carbide tools are not found to be suitable for cutting
    a. brass
    b. cast iron
    c. aluminium
    d. steel *
    e. nonferrous alloys

102. Sulphur in steel
    a. acts as deoxidiser
    b. reduces the grain size
    c. decreases tensil strength and hardness
    d. lowers the toughness and transverse ductility *
    e. increases hardness

103. Tungsten in steel
    a. improves wear resistance, cutting ability and toughness
    b. refines grain size and produces less tendency to carburisation, improves corrosion and heat resistant properties *
    c. improves cutting ability and reduces hardenability
    d. gives ductility, toughness, tensil strength and anticorrosion properties
    e. raises its melting point

104. Tungsten in high speed steel provides
    a. hot hardness *
    b. toughness
    c. wear resistance
    d. sharp cutting edge
    e. cold hardness

105. Which of the following is not the correct method of increasing fatigue limit
    a. shot peening
    b. nitriding of surface
    c. cold working
    d. surface decarbonisation *
    e. under-stressing

106. Connecting rod is usually made of
    a. aluminium
    b. low carbon steel
    c. medium carbon steel *
    d. high carbon steel
    e. cast iron

107. Which of the follwoing pipes is least corrosion resistant
    a. brass
    b. mild steel
    c. cast iron
    d. wrought iron *
    e. copper

108. Tensile strength of steel can be safely increased by
    a. adding carbon upto 2.8%
    b. adding carbon upto 6.3%
    c. adding carbon upto 0.83% *
    d. adding small quantities of copper
    e. adding copper and carbon

109. High carbon steel carries carbon % age of
    a. 0.1 to 0.3%
    b. 0.3 to 0.6%
    c. 0.6 to 0.8%
    d. 0.8 to 1.5% *
    e. 1.5 to 2.5%

110. Cobalt in steel
    a. improves wear resistance, cutting ability and toughness
    b. refines grain size and produces less tendency to carburisation, improves corrosion and heat resistant properties
    c. improves cutting ability and reduces hardenability*
    d. gives ductility, toughness, tensile strength and anticorrosion properties
    e. none of the above

111. The percentage of carbon in low carbon steel is
    a. 0.05%
    b. 0.15% *
    c. 0.3%
    d. 0.5%
    e. 0.7%

112. The hardness of steel increases if it contains
    a. austenite
    b. martensite *
    c. pearlite
    d. cementite
    e. all of the above

113. Grey cast iron
    a. contains 1.7 to 3.5% carbon in free state and is obtained by the slow cooling of molten cast iron *
    b. is also known as chilled cast iron and is obtained by cooling rapidly. It is almost unmachinable
    c. is produced by annealing process. It is soft, tough and easily machined metal
    d. is produced by small additions of magnesium (or cerium) in the ladle. Graphite is in nodular or spheroidal form and is well dispersed throughout the material
    e. none of the above is true

114. Nodular iron has
    a. high machinability
    b. low melting point
    c. high tensile strength
    d. good fluidity
    e. all of the above *

115. Nickle in steel
    a. improves wear resistance, cutting ability and toughness
    b. refines grain size and produces less tendency to carburisation, improves corrosion and heat resistant properties.
    c. improves cutting ability and reduces hardenability
    d. gives ductility, toughness, tensil strength and anticorrosion properties *
    e. none of the above

116. Which of the following elements does not impart hardness to steel
    a. copper *
    b. chromium
    c. nickle
    d. silicon
    e. none of the above

117. The presence of sulphur in pig iron makes
    a. it easily machinable
    b. it brittle
    c. it hard
    d. the casting unsound *
    e. increasing the fluidity

118. Melting point of iron is
    a. 1539^0C *
    b. 1601^0C
    c. 1489^0C
    d. 1712^0C
    e. 1131^0C

119. Compressive strength of grey cast iron in tonnes/cm^2 is of the order of
    a. 3-5
    b. 5-7 *
    c. 7-10
    d. 10-15
    e. 15-22

120. Blast furnace produces following by reduction of iron ore
    a. cast iron
    b. pig iron *
    c. wrought iron
    d. malleable iron
    e. carbon-chrome steel

121. Cupola produces following material
    a. cast iron *
    b. pig iron
    c. wrought iron
    d. malleable iron
    e. white iron

122. The machinability of steel is increased by
    a. silicon and sulphur
    b. phosphorous, lead and sulphur *
    c. sulphur, graphite and aluminium
    d. phosphorous and aluminium
    e. none of the above

123. The following element can't impart high strength at elevated temperature
    a. manganese
    b. magnesium *
    c. nickle
    d. silicon
    e. none of the above

124. Which of the following element results in presence of free graphite in C.I.
    a. carbon
    b. sulphur
    c. silicon *
    d. manganese
    e. phosphorous

125. White cast iron
    a. contains 1.7 to 3.5% carbon in free state and is obtained by the slow cooling of molten cast iron
    b. is also known as chilled cast iron and is obtained by cooling rapidly. It is almost unmachinable *
    c. is produced by annealing process. It is soft, tough and easily machined metal
    d. is produced by small additions of magnesium (or creium) in the ladle. Graphite is in nodular or spheroidal form and is well dispersed throughout the material
    e. none of the above

126. Cold rolled steel sheets contain carbon of the following order
    a. 0.1% *
    b. 0.2%
    c. 0.4%
    d. 0.6%
    e. 0.8%

127. Pipes for bicycle frames are made of
    a. cold rolled steel *
    b. hot rolled steel
    c. forged steel
    d. cast steel
    e. carbon-chrome steel

128. Large forgings, crank shafts, axles normally contain carbon upto
    a. 0.05 to 0.20%
    b. 0.20 to 0.45%
    c. 0.45 to 0.55% *
    d. 0.55 to 1.0%
    e. 1.0 to 1.2%

129. Heavy duty leaf and coil springs contain carbon of the following order
    a. 0.2%
    b. 0.5%
    c. 0.8%
    d. 1.0% *
    e. 1.5%

130. Taps, dies and drills contain carbon
    a. below 0.5%
    b. below 1%
    c. above 1% *
    d. above 2.2%
    e. nil

131. Drop forging dies contain carbon of the order of
    a. 0.1 to 0.2%
    b. 0.25 to 0.5%
    c. 0.6 to 0.7% *
    d. 0.7 to 0.9%
    e. 1.0 to 1.2%

132. Which is the false statement about wrought iron. It has
    a. high resistance to rusting and corrosion
    b. high ductility
    c. ability to hold protective coating
    d. easily weldable characteristics
    e. uniform strength in all directions *

133. The tensile strength of wrought iron is maximum
    a. along the lines of slag distribution *
    b. perpendicular to lines of slag distribution
    c. uniform in all directions
    d. unpredictable
    e. none of the above

134. Balls for ball bearings are made of
    a. cast iron
    b. mild iron
    c. stainless steel
    d. carbon-chrome steel *
    e. high carbon steel

135. malleable cast iron
    a. contains 1.7 to 3.5% carbon in free state and is obtained by the slow cooling of molten cast iron.
    b. is also known as chilled cast iron and is obtained by cooling rapidly. It is almost unmachinable.
    c. is produced by annealing process. It is soft, tough and easily machined metal *
    d. is produced by small additions of magnesium (or cerium) in the ladle. Graphite is in the nodular or spheroidal form and is well dispersed throughout the material.
    e. none of the above

136. Preheating is essential in welding
    a. cast iron *
    b. high speed steel
    c. all non-ferrous materials
    d. all of the above
    e. none of the above

137. The hardness of steel primarily depends on
    a. % age of carbon
    b. % age of alloying elements
    c. heat treatment employed
    d. method of manufacture
    e. shape of carbides and their distribution in iron *

138. Steel made from phosphatic iron is
    a. brittle *
    b. hard
    c. ductile
    d. tough
    e. malleable

139. Ductile cast iron
    a. contains 1.7 to 3.5% carbon in free state and is obtained by the slow cooling of molten cast iron
    b. is also known as chilled cast iron and is obtained by cooling rapidly. It is almost unmachinable
    c. is produced by annealing process. It is soft, tough and easily machined metal.
    d. is produced by small additions of magnesium (or creium) in the ladle. Graphite is in modular or spheroidal form and is well dispersed throughout the material *
    e. none of the above

140. Brass contains
    a. 70% copper and 30% zinc *
    b. 90% copper and 10% tin
    c. 85-92% copper and rest tin with little lead and nickle
    d. 70-75% copper and rest tin
    e. 70% copper and 30% tin

141. The crystal structure of brass is
  a. F.C.C. *
  b. B.C.C.
  c. H.C.P.
  d. Orthorhombic crystalline structure
  e. none of the above

142. The composition of silver solder is
  a. silver, copper, zinc *
  b. silver, tin, nickle
  c. silver, lead, zinc
  d. silver, copper, aluminium
  e. silver, lead, tin

143. Which one of the following metals would work-harden more quickly than the others ?
  a. copper
  b. brass *
  c. lead
  d. silver
  e. aluminium

144. A specimen of aluminium metal when observed under microscope shows
  a. B.C.C. crystalline shows
  b. F.C.C. crystal structure *
  c. H.C.P. structure
  d. a complex cubic structure
  e. orthorhombic crystalline structure

145. The usual composition of a soldering alloy is
  a. tin, lead and small percentage of antimony *
  b. tin and lead
  c. tin, lead and silver
  d. tin and copper
  e. tin, copper and lead

146. Admiralty brass used for steam condenser tubes contains copper and zinc in the following ratio
  a. 50 : 50
  b. 30 : 70 *
  c. 70 : 30
  d. 40 : 60
  e. 60 : 40

147. Corrosion resistance of steel is increased by adding
  a. chromium and nickle *
  b. nickle and molybdenum
  c. aluminium and zinc
  d. tungsten and sulphur
  e. none of the above

148. Corrundum contains more than 95%
  a. steel
  b. Al_2O_3 *
  c. SiO_2
  d. MgO
  e. german silver

149. Alnico, an alloy used extensively for permanent magnets contains iron, nickle, aluminium and cobalt in the following ratio
  a. 50 : 20 : 20 : 10 *
  b. 40 : 30 : 20 : 10
  c. 50 : 20 : 10 : 20
  d. 30 : 20 : 30 : 20
  e. 50 : 10 : 20 : 20

150. If a refractory contains high content of silicon, it means refractory is
  a. acidic
  b. basic
  c. neutral *
  d. brittle
  e. none of the above

151. Bell metal contains
  a. 70% copper and 30% zinc
  b. 90% copper and 10% tin
  c. 85-92% copper and rest tin with little lead and nickle
  d. 70-75% copper and rest tin *
  e. 70-75% copper and rest zinc and tin

152. Which of the following is used for bearing liner
  a. gun metal
  b. bronze
  c. bell metal
  d. babbit metal *
  e. brass

153. The correct sequence for descending order of machinability is
  a. grey cast iron, low carbon steel, wrought iron *
  b. low carbon steel, grey cast iron, wrought iron
  c. wrought iron, low carbon steel, grey cast iron
  d. wrought iron, grey-cast iron, low carbon steel
  e. grey cast iron, wrought iron, low carbon steel

154. Structural steel contains following principal alloying elements
  a. nickle, chromium and manganese *
  b. tungsten, molybdenum and phosphorous
  c. lead, tin, aluminium
  d. zinc, sulphur and chromium
  e. none of the above

155. Aluminium bronze contains aluminium and copper in the ratio of
  a. 50 : 50
  b. 40 : 60
  c. 60 : 40
  d. 10 : 90 *
  e. 90 : 10

156. Bronze contains
  a. 70% copper and 30% zinc
  b. 90% copper and 10% tin *
  c. 85-92% copper and rest tin with little lead and nickle
  d. 70-75% copper and 10% zinc
  e. 90% copper and 10% zinc

157. Muntz metal contains copper and zinc in the ratio
   a. 50 : 50
   b. 40 : 60
   c. 60 : 40 *
   d. 20 : 80
   e. 80 : 20

158. Gun metal contains
   a. 70% copper and 30% zinc
   b. 90% copper and 10% tin
   c. 85-92% copper and rest tin with little lead and nickle*
   d. 70-78% copper and rest tin
   e. 85-92% copper and rest zinc

159. Perminvar alloy having constant permeability is an alloy of
   a. nickle, copper and iron *
   b. nickle, copper and zinc
   c. copper, nickle and antimony
   d. iron, zinc and bismuth
   e. antimony, copper and zinc

160. The alloy used for making electrical resistances and heating element is
   a. nichrome *
   b. invar
   c. magnin
   d. elinvar
   e. perminvar

161. Monel metal contains
   a. 63 to 67% nickle and 30% copper *
   b. 88% copper and 10% tin and rest zinc
   c. alloy of tin, lead and cadmium
   d. malleable iron and zinc
   e. none of the above

162. Permalloy is a
   a. kind of stainless steel
   b. none ferrous alloy
   c. polymer
   d. cutting tool material
   e. nickle and iron alloy having high permeability *

163. Phosphor bronze contains
   a. 0.5% of phosphorous
   b. 1% phosphorous
   c. 2.5% phosphorous
   d. 5% phosphorous
   e. none of the above *

164. Free cutting steels
   a. are used where ease in machining is the criterion *
   b. contain carbon in free form
   c. require least cutting force
   d. do not exist
   e. can be cut freely even under adverse conditions.

165. Delta metal is an alloy of
   a. copper, zinc and iron *
   b. iron, nickle and copper
   c. iron, lead and tin
   d. iron, aluminium and magnesium
   e. copper, zinc and antimony

166. Admiralty gun metal contains
   a. 63 to 67% nickle and 30% copper
   b. 88% copper, 10% tin and rest zinc *
   c. alloy of tin, lead and cadmium
   d. iron scrap and zinc
   e. none of the above

167. Which of the following alloys does not contain tin
   a. white metal *
   b. solder admiralty
   c. fusible metal
   d. phosphor bronze
   e. gun metal

168. Which is false statement about properties of aluminium
   a. modules of elasticity is fairly low
   b. wear resistance is very good *
   c. fatigue strength is not high
   d. creep strength limits its use to fairy low temperatures
   e. corrosion resistance is good

169. Addition of copper to aluminium results in
   a. improvement of casting characteristics
   b. improvements of corrosion resistance
   c. one of the best known age and precipitation-hardening systems *
   d. improving machinability
   e. none of the above

170. Addition of manganese to aluminium results in
   a. improvement of casting characteristics
   b. improvement of corrosion resistance *
   c. one of the best known age and precipitation-hardening systems
   d. improving machinability
   e. none of the above

171. Elinvar, an alloy used in precision instruments, hair springs for watches, etc. contains the following element as principal alloying element
   a. iron
   b. copper
   c. aluminium
   d. zinc
   e. nickle *

172. Which of the following alloys does not have copper as one of the constituents
   a. delta metal
   b. monel metal
   c. constantan
   d. nichrome *
   e. silicon bronze

173. Addition of lead and bismuth to aluminium results in
 a. improvement of casting characteristics
 b. improvement of corrosion resistance
 c. one of the best known age and precipitation-hardening systems
 d. improving machinability *
 e. none of the above

174. Addition of silicon to aluminium results in
 a. improvement of casting characteristics *
 b. improvement of corrosion resistance
 c. one of the best known age and precipitation-hardening systems
 d. improving machinability
 e. none of the above

175. Constantant an alloy used in thermocouples is an alloy of
 a. copper and tin
 b. copper and zinc
 c. copper and iron
 d. copper and nickle *
 e. copper and chromium

176. White metal contains
 a. 63 to 67% nickle and 30% copper
 b. 88% copper and 10% tin and rest zinc
 c. alloy of tin, lead and cadmium *
 d. silver and chromium
 e. malleable cast iron and silver

177. Y-alloy contains
 a. 94% aluminium, 4% copper and 0.5% Mn, Mg, Si and Fe
 b. 92.5% aluminium and 40% copper, 2% nickle and 1.5% Mg *
 c. 10% aluminium and 90% copper
 d. 90% magnesium and 9% aluminium with some copper
 e. 92.5% aluminium and 7.5% zinc

178. German silver contains
 a. 1% silver
 b. 2.5% silver
 c. 5% silver *
 d. 10% silver
 e. 100% silver

179. Which of the following has highest specific strength of all structural materials
 a. magnesium alloys
 b. titanium alloys *
 c. chromium alloys
 d. magnetic steel alloys
 e. none of the above

180. Dow metal contains
 a. 94% aluminium, 4% copper and 0.5% Mn, Mg, Si and Fe
 b. 92.5% aluminium and 4% copper, 2% nickle and 1.5% Mg
 c. 10% aluminium and 90% copper
 d. 90% magnesium and 9% aluminium with some copper *
 e. 90% magnesium and 10% tin

181. Foundary crucible is made of
 a. mild steel
 b. german silver
 c. lead
 d. cast iron
 e. graphite *

182. Age-hardening is related with
 a. stainless steel
 b. gun metal
 c. german silver
 d. duralumin *
 e. cast iron

183. Aluminium bronze contains
 a. 94% aluminium, 4% copper and 0.5% Mn, Mg, Si and Fe
 b. 92.5% aluminium, 4% copper, 2% nickle and 1.5% Mg
 c. 10% aluminium and 90% copper *
 d. 90% magnesium and 9% aluminium with some copper
 e. 10% aluminium and 90% tin

184. Babbit metal is a
 a. lead base alloy
 b. tin base alloy
 c. copper base alloy
 d. all of the above
 e. (a) and (c) above *

185. The correct composition of Babbit metal is
 a. 87.75% Sn, 4% Cu, 8% Sb, 0.25% Bi *
 b. 90% Sn, 2% Cu, 4% Sb, 2% bi, 2% Mg
 c. 87% Sn, 4% Cu, 8% Sb, 1% Al
 d. 82% Sn, 4% Cu, 8% Sb, 3% Al, 3% Mg
 e. none of the above

186. Duralumin contains
 a. 94% aluminium, 4% copper and 0.5% Mn, Mg, Si and Fe *
 b. 92.5% aluminium, 40% copper, 2% nickle and 1.5% Mg
 c. 10% aluminium and 90% copper
 d. 90% magnesium and 9% aluminium
 e. 94% aluminium an 6% tin

187. Neutral solution is one which has pH value
 a. grater than 7
 b. less than 7
 c. equal to 7 *
 d. pH value has nothing to do with neutral solution
 e. none of the above

188. Acidic solution is one which has pH value
 a. grater than 7
 b. less than 7 *
 c. equal to 7
 d. pH value has nothing to do with neutral solution
 e. none of the above

189. Which is correct curve (Fig. 1) to show relationship between conductivity and alloy of copper and nickle at various percentages
   a. A
   b. B
   c. C
   d. D *
   e. none of the above

190. Basic solution is one which has pH value
   a. greater than 7 *
   b. equal to 7
   c. less than 7
   d. pH value has nothing to do with basic solution
   e. none of the above

191. Following elements have face-centred cubic structure
   a. gamma iron (910^0 to 1400^0C), Cu, Ag, Au, Al, Ni, Pb, Pt *
   b. Mg, Zn, Ti, Zr, Br, Cd
   c. α iron (below 910^0C and between 1400 to 1539^0C), W
   d. all of the above
   e. none of the above

192. recrystallisation temperature can be lowered by
   a. purification of metal
   b. grain refinement
   c. working at lower temperature
   d. all of the above *
   e. none of the above

193. Pearlite is a combination of
   a. ferrite and cementite *
   b. cementite and gamma iron
   c. ferrite and austenite
   d. ferrite and iron graphite
   e. pearlite and ferrite

194. Austenite is a combination of
   a. ferrite and cementite
   b. cementite and gamma iron *
   c. ferrite and austenite
   d. ferrite and iron graphic
   e. pearlite and ferrite

195. The transistor is made of
   a. silver
   b. gold
   c. copper
   d. germanium *
   e. german silver

196. Lead is poured into the joint between two pipes. These pipes may be made of
   a. cast iron *
   b. vitrified clay
   c. asbestos cement
   d. concrete
   e. mild steel

197. Which of the following element is added to steel to impart high strength and toughness
   a. magnesium
   b. manganese *
   c. phosphorous
   d. sulphur
   e. tungsten

198. Free carbon in iron makes it
   a. soft and imparts coarse grained crystalline structure *
   b. hard and imparts fine grained crystalline structure
   c. hard and imparts coarse grained crystalline structure
   d. soft and imparts fine grained crystalline structure
   e. malleable

199. Combined corrosion in iron makes it
   a. soft and imparts coarse grained crystalline structure
   b. hard and imparts fine grained crystalline structure*
   c. hard and imparts coarse grained crystalline structure
   d. soft and imparts fine grained crystalline structure
   e. malleable

200. Which of the following has better capability to bear sudden and excessive shocks
   a. cast iron
   b. pig iron
   c. white iron
   d. wrought iron *
   e. stainless steel

201. Among the following materials, the most suitable material for withstanding shock and vibration without danger of cracking is
   a. chilled cast iron
   b. gray cast iron
   c. malleable iron *
   d. white cast iron
   e. graphite

202. Hardenability of shell
   a. is the depth of penetration obtained by Vickers test
   b. is the ability of steel to resist abrasion, wear and penetration
   c. is the property which determines the depth of the hardened zone induced by quenching *
   d. is achieved throughout its full depth, when the actual cooling rate equals the critical cooling rate
   e. is its ability to withstand shocks

203. Following elements have body-centred cubic structure
   a. gamma iron (910^0 to 1400^0C), Cu, Ag, Au, Al, Ni, Pb, Pt
   b. Mg, Zn, Ti, Zr, Be, Cd
   c. α iron (below 910^0C and between 1400 to 1539^0C), W, V, Mo, Cr, Na, K, Li, etc.*
   d. all of the above
   e. none of the above

204. Silicon steel used for electrical equipment contains following percentage of silicon
   a. 0.2% to 0.5%
   b. 2%
   c. 3.4% *
   d. 6.5%
   e. 8-90%

205. Following elements have hexagonal close-pack structure
   a. gamma iron (910^0 to 1400^0C), Cu, Ag, Au, Al, Ni, Pb, Pt
   b. Mg, Zn, Ti, Zr, Be, Cd *
   c. α iron (below 910^0C and between 1400 to 1539^0C), W, V, Mo, Cr, Na, K, Li, etc.
   d. all of the above
   e. none of the above

206. The four major parts of blast furnace from top to bottom in order are
   a. top, stack, hearth, bosh
   b. top, stack, bosh, hearth *
   c. top, bosh, stack, hearth
   d. top, bosh, hearth, stack
   e. none of the above

207. The purpose of iron ore in the charge for blast furnace is
   a. to act as an aggregate of iron-bearing mineral *
   b. to supply heat to reduce ore and melt the iron
   c. to form a slag by combining with impurities
   d. to control the grade of cast iron produced
   e. none of the above

208. The product of cupola is called
   a. pig
   b. cast iron *
   c. mild steel
   d. wrought iron
   e. non-ferrous material

209. The purpose of scrap steel in the charge for blast furnace is
   a. to act an aggragate of iron-bearing mineral
   b. to supply heat to reduce ore and melt the iron
   c. to form a slag by combining with impurities
   d. to control the grade of cast iron produced *
   e. none of the above

210. For the same capacity of production
   a. basic converter is smaller than acid converter
   b. acid converter is smaller than basic converter *
   c. both are of equal size
   d. size would depend on other factors
   e. none of the above

211. To form basic slag, the following is added
   a. lime *
   b. coke
   c. scrap
   d. manganese
   e. aluminium

212. Sub zero treatment of steel
   a. is used to reduce the retained austenite in hardened steel *
   b. increases the ability of steel to work in sub-zero atmospheres
   c. is used to suppress martensite transformation
   d. is performed after hardening operation to induce temper brittleness
   e. is never used

213. The purpose of coke in the charge for blast furnace is
   a. to act as an aggregate of iron-bearing mineral
   b. to form a slag by combining with impurities
   c. to supply heat to reduce ore and melt the iron *
   d. to control the grade of cast iron produced
   e. none of the above

214. The quantity of lime required in a cupola for production of 1 tonne of casting is of the order of
   a. 30 kg *
   b. 50 kg
   c. 100 kg
   d. 300 kg
   e. 1000 kg

215. Lime stone is added in blast furnace to flux
   a. MnO_2
   b. SiO_2 *
   c. carbon
   d. NH_3
   e. $KMnO_2$

216. The purpose of lime in the charge for blast furnace is
   a. to act as an aggregate of iron-bearing mineral
   b. to form a slag by combining with impurities
   c. to control the grade of iron produced *
   d. to supply heat to reduce ore and melt the iron
   e. none of the above

217. Coal used in cupola is
   a. coke *
   b. coal dust
   c. charcoal
   d. pulverised coal
   e. any one of the above

218. The significance of the yellow flame during the operation of the bessemer converter is
   a. that air is burning out the silicon and manganese resulting in high increase in temperature and scrap steel needs to be added to control temperature *
   b. that silicon has burned out and carbon has started burning
   c. that the converter must be tilted and air turned off, otherwise iron would oxidise
   d. yellow flame does not occur in operation of bessemer converter
   e. none of the above

219. The quantity of coke required in a cupola for production of 1 tonne of casting is of the order of
    a. 30 kg   b. 300 kg *
    c. 700 kg   d. 1000 kg
    e. 1300 kg

220. For better fluidity, the following is added in blast furnace
    a. phosphorous   b. sulphur
    c. carbon   d. manganese *
    e. none of the above

221. Case hardening of steel
    a. is the saturation of the surface of steel with carbon by heating it at a high temperature
    b. is the saturation of the surface of steel with any element by its diffusion from the surrounding medium at a high temperature *
    c. is the hardening of the casing or surface of steel by proper heat treatment
    d. involves diffusion of carbon and nitrogen in the surface of steel above the critical temperature on heating
    e. improves surface finish

222. The hardest known material is
    a. ceramic   b. high speed steel
    c. diamond *   d. cemented carbide
    e. alloy steel

223. The significance of the white flame during the operation of the bessemer converter is
    a. that air is burning out of the silicon and manganese resulting in high increase in temperature and scrap steel needs to be added to control temperature
    b. that silicon has burned out and carbon has started burning *
    c. that the converter must be tilted and air turned off, otherwise iron would oxidise
    d. white flame does not occur during the operation of the bessemer converter
    e. none of the above

224. Blast furnace uses the following as fuel
    a. coal   b. coke *
    c. diesel   d. liquid oxygen
    e. producer gas

225. The property of corrosion resistance of chromium stainless steels is due to
    a. predominating nature of chromium present in stainless steel
    b. the formation of a thin film of oxygen and moisture absorbed from the atmosphere
    c. the formation of a thin oxide film of Cr_2O_3 on the surface of steel *
    d. super-fire finish of stainless steel which gives no opportunity for any atmospheric constituent to penetrate into the surface
    e. the inherent property of chromium to resist corrosion

226. Presence of sulphur makes steel brittle. Its effect can be reduced by adding
    a. copper
    b. magnesium
    c. silicon
    d. vanadium
    e. manganese *

227. The significance of dieing down of white flame during the operation of the bessemer converter is
    a. that air is burning out the silicon and manganese resulting in high increase in temperature and scrap steel needs to be added to control temperature
    b. that silicon has burned out and carbon has started burning
    c. that the converter must be tilted and air turned off, otherwise iron would oxidise *
    d. such a phenomenon does not occur
    e. none of the above

228. Diamond has
    a. low heat conductivity
    b. high electrical conductivity
    c. lowest thermal expansion *
    d. high coefficient of friction against all metals
    e. all of the above

229. Nickle is
    a. ferroelectric
    b. ferromagnetic *
    c. paramagnetic
    d. dielectric
    e. semi-conductor

230. Diamagnetic materials
    a. are nonmagnetic
    b. can't be magnetised
    c. can be magnetised in one direction only
    d. are magnetised in direction opposite to that of applied field *
    e. can be magnetised by eddy currents

231. The relationship between hardness and % carbon for steel (fig.2) can be expressed by the curve
    a. A *
    b. B
    c. C
    d. D

232. The relationship between tensile strength and % carbon for steel (Fig. 3) can be expressed by the curve
    a. A
    b. B *
    c. C
    d. D

233. Which of the following is the hardest material
    a. hardened steel   b. tungsten carbide
    c. alloy steel   d. silicon carbide
    e. boron carbide *

234. Which of the following steel has almost zero temperature coefficient
    a. invar steel *
    b. platinum steel
    c. stainless steel
    d. nickle-chromium steel
    e. cobalt steel

235. The significance of red flame during the operation of the bessemer converter is
    a. that air is burning out the silicon and manganese resulting in high increase in temperature and scrap steel needs to be added to control temperature
    b. that silicon has burned out and carbon has started burning
    c. that the converter must be tilted and air turned off, otherwise iron would oxidise
    d. red flame does not occur during the operation of the bessemer converter *
    e. none of the above

236. Soaking pit is
    a. a controlled temperature pit in which parts are heated
    b. an arrangement in which parts are burried underground and packed with coke which is burnt subsequently
    c. an oil or gas heated furnace for bringing the temperature of the ingots to a uniform value throughout *
    d. there is nothing like soaking pit
    e. none of the above

237. Lining of open hearth furnace
    a. provides insulation to contain heat within the furnace
    b. controls impurities in steel
    c. acts as structure
    d. enhances furnace life *
    e. none of the above

238. Ingots are
    a. as obtained from solidification of molten metal into moulds *
    b. obtained by passing hot steel through the rolling mills and are of size 150 mm × 350 mm.
    c. obtained by further rolling and are of size 50 mm × 50 mm to 125 mm × 125 mm
    d. scraps from blast furnace
    e. none of the above

239. Blast furnace gas
    a. is used as fuel for other plants *
    b. is discharged into atmosphere
    c. is recirculated back to blast furnace
    d. all of the above
    e. none of the above

240. Blooms are
    a. as obtained from solidification of molten metal in moulds
    b. obtained by passing hot ingots through the rolling mills and are of size 150 mm × 150 mm to 350 mm × 350 mm *
    c. obtained by further rolling and are of size 50 mm × 50 mm to 125 mm × 125 mm
    d. scraps from rolling mills
    e. none of the above

241. Which of the following is not a structural steel shape
    a. I
    b. T
    c. O
    d. H
    e. V *

242. High silicon content means refractoory is
    a. basic
    b. acidic
    c. neutral *
    d. no such correlation exists
    e. none of the above

243. The mechanical properties of steel castings can be improved by following heat treatment process
    a. full annealing
    b. tempering
    c. normalising
    d. phase annealing *
    e. incomplete hardening

244. Steels containing low percentages of nickle, tungsten or chromium are classified as
    a. plain carbon steels *
    b. alloy steels
    c. tools steels
    d. stainless steels
    e. wrought steel

245. Which of the following has least percentage of carbon
    a. malleable iron
    b. pig iron
    c. stainless steel
    d. wrought iron *
    e. graphite

246. Steels containing high percentages of elements other than carbon are classified as
    a. alloy steels *
    b. stainless steels
    c. structural steels
    d. high carbon steels
    e. tool steels

247. The following element is alloyed with high carbon tool steel to increase the resistance to shock
    a. carbon
    b. tungsten
    c. nickle
    d. vanadium *
    e. chromium

248. Which of the following is the most ductile material
   a. mild steel *
   b. copper
   c. zinc
   d. aluminium
   e. nickle

249. A test commonly applied to steel of unknown quality for identification purposes is the
   a. acid-etch test
   b. spark test *
   c. fracture test
   d. dye-penetrant test
   e. impact test

250. Which of the following has maximum malleability
   a. lead *
   b. brass
   c. wrought iron
   d. copper
   e. aluminium

251. High speed steel (H.S.S.) belongs to the category of
   a. low-carbon steel
   b. medium-carbon steel
   c. high-carbon steel
   d. alloy steel *
   e. stainless steel

252. Stainless steel contains
   a. chromium, iron and nickle
   b. chromium and nickle
   c. iron and carbon
   d. chromium, nickle, iron and carbon *
   e. tungsten, vanadium and chromium

253. Which of the following materials would readily fracture of hit with a hammer
   a. german silver
   b. lead
   c. brass
   d. bronze
   e. cast iron *

254. Billets are
   a. obtained from solidification of molten metal into moulds
   b. obtained by passing hot ingots through the rolling mills and are of size 150 mm × 150 mm to 350 × 350 mm
   c. obtained by further rolling and are of size 50 mm × 50 mm to 125 mm × 125 mm *
   d. scraps from unused blooms
   e. none of the above

255. Oxygen lance in open hearth furnace is used to
   a. measure O_2 content
   b. remove O_2
   c. introduce O_2 in furnace *
   d. maintain O_2 at a constant value
   e. none of the above

256. As the impurities are oxidised, the melting point of iron
   a. increases *
   b. decreases
   c. remains same
   d. depends on the type of furnace used
   e. unpredictable

257. Following etching solution is used for low-carbon steel and welds
   a. nital -2% HNO_3 in ethyl alcohol *
   b. picral -5% picric acid and ethyl alcohol
   c. 1% hydrofluoric acid in water
   d. 50% NH_4OH and 50% water
   e. none of the above

258. In making high silicon content steel, scrap can be used
   a. to form slag
   b. as catalyst
   c. to control grade
   d. as coolant *
   e. can't be used

259. In making high silicon content steel, scrap can be used
   a. to form slag
   b. as catalyst
   c. to control grade *
   d. as coolant
   e. can't be used

260. Following etching solution is used for aluminium
   a. nital -2% HNO_3 in ethyl alcohol
   b. picral -5% picric acid and ethyl alcohol
   c. 1% hydrofluoric acid in water *
   d. 50% NH_4OH and 50% water
   e. none of the above

261. Tar dolomite bricks can withstand temperature upto
   a. 750^0C
   b. 1500^0C *
   c. 2000^0C and more
   d. 5000^0C
   e. none of the baove

262. The relationship between tensile strength and hardness for steel can be expressed by the curve (Fig.4)
   a. A *
   b. B
   c. C
   d. D
   e. none of the above

263. The relationship between wear and hardness for steel can be expressed by the curve (Fig.5)
   a. A *
   b. B
   c. C
   d. D
   e. none of the above

264. Following etching solution is used for copper
a. nital -2% HNO_3 in ethyl alcohol
b. picral -5% picric acid and ethyl alcohol
c. 1% hydrofluoric acid in water
d. 50% NH_4OH and 50% water *
e. none of the above

265. The load and standard steel ball used for Brinell hardness number are
a. 300 kg, 1 mm
b. 300 kg, 5 mm
c. 300 kg, 10 mm
d. 3000 kg, 10 mm *
e. 3000 kg, 5 mm

266. Rockwill 'C' scale uses minor increment load of 10 kg and the major increment load and diamond indenter respectively are
a. 100 kg and 118^0
b. 140 kg and 118^0
c. 150 kg and 120^0
d. 140 kg and 120^0 *
e. none of the above

267. On Rockwell 'C' scale, one Rockwell number is represented by penetration depth of
a. 0.0080 inch
b. 0.000080 inch
c. 0.000080 inch *
d. 0.0000080 inch
e. none of the above

268. Rockwell reading is a measure of the penetration caused by the
a. major load only *
b. minor load only
c. both major and minor loads
d. standard load
e. none of the above

269. Two Rockwell readings are 50 RC and 65 RC. What is the increment of penetration between the two readings
a. 0.0012 inch more in first case *
b. 0.0012 inch more in second case
c. 0.0006 inch less in first case
d. 0.0006 inch less in second case
e. none of the above

270. Brinell tester uses a hardness steel ball of size
a. 1 mm
b. 5 mm
c. 10 mm *
d. 15 mm
e. 25 mm

271. Mohr's scale is used in connection with
a. composition of metal
b. hardness of materials *
c. wear criterion of metals
d. tensile strength of metals
e. none of the above

272. Mohr's scale has a range of
a. 1 to 5
b. 1 to 10 *
c. 1 to 12
d. 1 to 15
e. hardness number

273. The hardness number 10 on Moh's scale for hardness is assigned to
a. quartz
b. talc
c. topaz
d. corundum
e. diamond *

274. The hardness number 1 on Moh's scale is assigned to
a. quartz
b. talc *
c. topaz
d. corundum
e. diamond

275. Brinell hardness number is expressed by the equation
a. $BHN = \dfrac{2L}{\pi D (D - \sqrt{D^2 - d^2})}$ *
b. $BHN = \dfrac{L}{\pi D (D - \sqrt{D^2 - d^2})}$
c. $BHN = \dfrac{2L}{\pi d (D - \sqrt{D^2 - d^2})}$
d. $BHN = \dfrac{L}{\pi d (D - \sqrt{D^2 - d^2})}$
e. none of the above
where L = load in kg, D = dia. of ball in mm, d = dia. of indentation in mm.

276. Charpy test is conducted to measure
a. hardness
b. fracture stress
c. fatigue resistance
d. brittleness *
e. malleability

277. The hardness of lathe bed material should be measured by
a. Rockwell tester
b. Brinell hardness tester
c. Shore Scleroscope *
d. Vickers hardness tester
e. Scratch hardness tester

278. Iron alloyed with carbon upto 2% is called
a. cast iron
b. steel *
c. mild steel
d. high carbon steel
e. iron alloy

279. Iron alloyed with carbon in percentage greater than 2% is called
    a. cast iron *
    b. steel
    c. mild steel
    d. high carbon steel
    e. carbon alloy

280. Pearlitic or eutectoid steels have carbon content
    a. equal to 0.83% *
    b. less than 0.83%
    c. more than 0.83% and upto 2%
    d. more than 2%
    e. more than 6.3%

281. The binding material for cementite carbide tools is
    a. iron
    b. chromium
    c. nickle
    d. cobalt *
    e. solder

282. Hypoeutectoid steels have carbon content
    a. equal to 0.83%
    b. less than 0.83% *
    c. more than 0.83% and upto 2%
    d. more than 2%
    e. more than 6.3%

283. Phosphorous and sulphur in manufacturing steel can be removed only by
    a. acid bessemer converter
    b. induction furnace
    c. basic bessemer converter *
    d. neutral bessemer converter
    e. none of the above

284. Hypereutectoid steels have carbon content
    a. equal to 0.83%
    b. less than 0.83%
    c. more than 0.83% and upto 2% *
    d. more than 2%
    e. more than 6.3%

285. Cementite phase has carbon content
    a. less than 0.83%
    b. more than 0.83% and less than 2%
    c. more than 2%
    d. more than 6.67% *
    e. none of the above

286. Reinforcing bars used in RCC slabs are made of
    a. cast iron
    b. wrought iron
    c. alloy steel
    d. medium carbon steel *
    e. tool steel or high carbon steel

287. Eutectoid steels have structure of
    a. pearlite alone *
    b. phases of ferrite and pearlite
    c. phases of cementite and pearlite
    d. phases of ferrite and cementite
    e. none of the above

288. Typical examples of products produces by powder metallurgy are
    a. refractory metals like tungsten, molybdenum etc.
    b. super hard material like cemented carbides
    c. bearings and porous metallic parts
    d. all of the above *
    e. none of the above

289. Metal powder for powder metallurgy process is made by
    a. reduction of oxide
    b. atomisation
    c. electrolyte deposition
    d. milling or grinding
    e. any one of the above *

290. The tensile strength of structural steel with rise in temperature will vary as (Refer Fig. 6)
    a. curve A *
    b. curve B
    c. curve C
    d. curve D
    e. none of the above

291. The percentage elongation of structural steel with rise in temperature will vary as (Refer Fig. 7)
    a. curve A
    b. curve B
    c. curve C
    d. curve D *
    e. none of the above

292. Hypoeutecoid steels have structure of
    a. pearlite alone
    b. phases of ferrite and pearlite *
    c. phases of cementite and pearlite
    d. phases of ferrite and cementite
    e. none of the above

293. When steel with 0.8% carbon is cooled from temperature of 950^0C the pearlite would occur at the following fixed temperature
    a. 910^0C
    b. 850^0C
    c. 770^0C
    d. 723^0C *
    e. 650^0C

294. Copper and aluminium have tendency to absorb following gas at high temperature
    a. CO_2
    b. N_2
    c. NH_3
    d. H_2 *
    e. all of the above

295. Hyperceutectoid steels have structure of
    a. pearlite alone
    b. phases of ferrite and pearlite
    c. phases of cementite and pearlite *
    d. phases of ferrite and cementite
    e. none of the above

296. The temperature and carbon content at which eutectic reaction occurs in Fe-C equilibrium diagram are
a. 723^0C and 0.02% C
b. 723^0C and 0.80% C
c. 910^0C and 4.30% C *
d. 1130^0C and 2.00% C
e. 1130^0C and 4.30% C

297. The temperature at which new grains are formed in a metal is called
a. recrystallisation temperature *
b. lower critical temperature
c. upper critical temperature
d. eutectic temperature
e. allotropic temperature

298. The temperature and carbon content at which eutectoid reaction occurs in Fe-C equilibrium diagram are
a. 723^0C and 0.02% C
b. 723^0C and 0.80% C *
c. 1130^0C and 2.00% C
d. 1130^0C and 4.30% C
e. 710^0C and 0.69% C

299. Gibb's phase rule is given by the expression F is equal to
a. C + P
b. C - P
c. C - P - 2
d. C + P - 2
e. C - P + 2 *
where F = no. of degrees of freedom
C = no. of components and
P = no. of phases

300. Steel is made from cast iron by removing all excess
a. ferrous carbide
b. carbon *
c. tungsten
d. sulphur
e. oxygen

301. The most important element which controls the physical properties of steel is
a. silicon
b. manganese
c. tungsten
d. carbon *
e. chromium

302. Large amounts of silicon when added to steel will increase the following properties of the steel
a. mechanical
b. refractory
c. corrosive
d. magnetic *
e. machining

303. A semi conductor material has following number of electrons in outermost orbit
a. 2
b. 4 *
c. 5
d. 6
e. 8

304. In full annealing process, the hypoeutectoid steel is
a. heated above A, line and cooled very slowly in furnace as to refine old structure *
b. heated below A_1 line with a view to make steel ductile for cold working
c. heated below A_1 line and cooled slowly with a view to remove internal stresses
d. heated above A_3 line and cooled in air resulting in slight hardening
e. none of the above

305. machinabilty of a metal depend on
a. hardness
b. tensile strength
c. brittleness
d. toughness
e. both 'a' and 'b' *

306. Pick up wrong property of austenite
a. softness
b. malleability
c. magnetism *
d. ductility
e. none of the above

307. In process annealing process, the hypoeutectoid steel is
a. heated above A_3 line and cooled very slowly in furnace so as to refine old structure
b. heated below A_1 line with a view to make steel ductile for cold working *
c. heated below A_1 line and cooled slowly with a view to remove internal stresses.
d. heated above A_3 line and cooled in air resulting in slight hardening
e. none of the above

308. The imperfection in the crystal structure of metal is called
a. dislocation *
b. slip
c. fracture
d. impurity
e. cleavage

309. Thermosetting plastics
a. soften on the application of heat and can be repeatedly moulded
b. will not deform when again subjected to heat *
c. are produced on a synthetic resin base
d. are synthetic base resin having a predefined setting temperature
e. none of the above

310. Other than elasticity and rubber like material, the important property of polyvinyl chloride (PVC) is
a. odourless
b. colourability
c. non-flammable *
d. impervious to water
e. appearance

311. Filler is used in plastics to
   a. completely fill up the voids created during manufacturing
   b. improve plasticity, strength and toughness
   c. provide colour, strength, compact and toughness*
   d. to accelerate the condensation and polymerisation
   e. all of the above

312. Which of the following moulding methods is generally not used for thermoplastic materials
   a. extrusion
   b. injection
   c. casting *
   d. calendaring
   e. all of the above

313. Hypo-eutectoid steels for hardening purposes are heated by 30-50^{0}C
   a. above lower critical temperature
   b. below lower critical temperature
   c. below upper critical temperature
   d. above upper critical temperature *
   e. in between lower and upper critical temperatures

314. The moulding process employed for thermoplastic material is
   a. injection and extrusion methods *
   b. compression and transfer moulding methods
   c. similar to thermosetting plastics except that higher temperature is used
   d. similar to thermosetting plastics except that a lower temperature is used
   e. die casting

315. Pigments are fine, solid particles used in preparation of
   a. varnishes
   b. plastics
   c. chemicals
   d. paints *
   e. all of the above

316. One of the main disadvantage of thermosetting and thermoplastic plastics is that
   a. they deform under heat and pressure
   b. they are resistant to water upto 100^{0}C only
   c. they do not posses a high mechanical strength *
   d. their shape cannot be changed without application of heat
   e. all of the above

317. Polyesters belong to the group of
   a. thermoplastic plastics
   b. thermosetting plastics *
   c. phenolics
   d. PVC
   e. all of the above

318. The dominant property of cellulosics, a form of thermoplastic plastics is
   a. case of working and toughness *
   b. corrosion resistance and mechanical strength
   c. high heat and wear resistance and fine grain structure
   d. good colour, finish, texture and light transmissibility
   e. all of the above

319. Crystal structure of metals is studied by
   a. metallograph techniques
   b. X-ray techniques *
   c. ultrasonic method
   d. electron microscopy
   e. high powered microscope

320. The grain growth in austenite during heat treatment of steel can be inhibited by adding
   a. copper
   b. aluminium *
   c. nickle
   d. manganese
   e. magnesium

321. Heat treatment operation involving heating of steel above upper critical temperature and then cooling it in the furnace is known as
   a. annealing *
   b. tempering
   c. austempering
   d. normalising
   e. stress-relieving

322. Heat treatment operation involving heating of steel above upper critical temperature and then cooling it in air is known as
   a. annealing
   b. tempering
   c. austempering
   d. normalising *
   e. stress-relieving

323. Tempering temperature of most of the materials is of the order of
   a. 100-150^{0}C   b. 200-300^{0}C *
   c. 350-400^{0}C   d. 400-500^{0}C
   e. 500-650^{0}C

324. Normalising operation is carried out in
   a. furnace
   b. air *
   c. water
   d. oil
   e. controlled atmosphere

325. The effect of alloying zinc to copper is
   a. to raise hardness
   b. to impart free-machining properties
   c. to improve hardness and strength
   d. to increase strength and ductility (if added upto 10-30%) *
   e. to improve welding characteristics

326. Which of the following is better suited for lighter duty bearings
a. white metal
b. phosphor bronze *
c. monel metal
d. nimonic alloys
e. plastics

327. Which of the following is better suited for heavier duty bearings
a. white metal *
b. phosphorous bronze
c. monel metal
d. nimonic alloys
e. palstics

328. The effect of alloying nickle to copper is
a. to raise hardness *
b. to impart free-machining properties
c. to improve hardness and strength
d. to increase strength and ductility (if added upto 10-30%)
e. to improve welding characteristics

329. The effect of alloying lead to copper is
a. to raise hardness
b. to impart free-machining properties *
c. to improve hardness and strength
d. to increase strength and ductility (if added upto 10-30%)
e. to improve welding characteristics

330. The grain structure obtained by isothermal hardening operation is
a. martensite
b. sorbite
c. bainite
d. troostite
e. acicular troostite *

331. In order to prevent excessive scaling of parts being hardened in heating furnace, following should be properly controlled
a. atmosphere
b. temperature *
c. fuel
d. air-fuel ratio
e. draft

332. In nitriding steel components, the following atmosphere is generally used in the furnace
a. inert
b. nascent nitrogen
c. liquid nitrogen
d. carbon
e. ammonia *

333. After annealing a non-ferrous metal, surface oxides formed on the metal are
a. removed with coarse emery cloth
b. left on the metal to protect the surface
c. pickled in acid and then removed *
d. hammerd into the surface
e. polished to give a good colour

334. Pick up the wrong statement. Annealing results in
a. refining grain structure
b. relieving internal stresses
c. improving wear resistance *
d. improving machinability
e. all of the above are true

335. The effect of alloying silicon to copper is
a. to raise hardness
b. to impart free-machining properties
c. to improve hardness and strength *
d. to increase strength and ductility (if added upto 10-30%)
e. to improve welding characteristics.

336. In ductile cast iron, the free carbon is distributed through out the mass in the form of
a. needles
b. flakes
c. nodules *
d. crystals
e. molecules

337. The portion of the part not be hardened in nitriding process is covered by a layer of
a. asbestos
b. tin *
c. copper
d. aluminium
e. steel

338. The effect of alloying tin to copper is
a. to raise hardness
b. to impart free-machining properties
c. to improve hardness and strength *
d. to increase strength and ductility (if added upto 10-30%)
e. to improve welding characteristics

339. The hardening of machine tool guideways is usually done by
a. induction hardening
b. flame hardening *
c. salt bath furnaces
d. vaccum hardening
e. spraying hard metal

340. In stress relieving process, the hypoeutectoid steel is
a. heated above A_3 line and cooled very slowly in furnace as to refine old structure
b. heated below A_1 line with a view to make steel ductile for cold working *
c. heated below A_1 below line and cooled slowly with a view to remove internal stresses
d. heated above A_3 line and cooled in air resulting in slight hardening
e. none of the above

341. Austempering is the heat treatment process used to obtain greater
   a. hardness *
   b. toughness
   c. softness
   d. brittleness
   e. ductility

342. To eliminate the brittleness which occurs due to welding of saw blades, the welded portion must be
   a. toughened
   b. annealed *
   c. work hardened
   d. forged
   e. tempered

343. Pick up the wrong statement. Normalising results in
   a. improving mechanical properties
   b. refining coarse grain structure obtained during hot working
   c. improving ductility *
   d. improving yield strength
   e. all of the above are true

344. Spheradising is the process in which the objects
   a. are electroplated to obtain wear resistant surface
   b. are treated before painting
   c. are normalised after hardening
   d. to be coated are packed in powdered zinc and heated *
   e. none of the above

345. Selection of a material for a particular use is based on following consideration
   a. service requirements
   b. fabrication characteristics
   c. cost
   d. all of the above
   e. none of the above *

346. Austenite can exist even at sub zero temperature by having high percentage of
   a. chromium *
   b. manganese
   c. magnesium
   d. cobalt
   e. aluminium

347. Beryllium is used chiefly as an alloy addition to copper to produce
   a. precipitation-hardening alloy
   b. corrosion resistant alloy
   c. high-strength alloy
   d. non-magnetic and non-sparking alloy *
   e. all of the above

348. Which of the following has maximum hardness
   a. austenite b. pearlite
   c. troostite d. martensite *
   e. sorbite

349. Which of the following is not the objective of normalising
   a. refine steel structure
   b. remove strains caused by cold working of metal
   c. remove internal stresses *
   d. improve tensile strength
   e. inprove machinability

350. The main purpose of heat treatment of steels is to change the
   a. chemical composition
   b. mechanical properties *
   c. corrosion properties
   d. surface finish
   e. physical properties

351. Low carbon steel can be hardened by
   a. hardening
   b. heating and quenching in oil
   c. heating and quenching in water
   d. carburizing and cyaniding *
   e. any one of the above

352. The hardening strains are reduced and the toughness of the part increased by the following process after hardening
   a. annealing
   b. carburizing
   c. tempering *
   d. anodizing
   e. galvanizing

353. Hard alloy and tool steels are made easy machinable by following heat treatment
   a. case carburizing
   b. tempering
   c. annealing *
   d. normalising
   e. spherodising

354. Case hardening is the only method suitable for hardening
   a. high alloy steel
   b. high carbon steel
   c. low-carbon steel *
   d. high speed steel
   e. tungsten carbides

355. Which of the following element in steel directly affects the critical temperature of the steel to be heat-treated
   a. sulphur
   b. phosphorous
   c. carbon *
   d. chromium
   e. manganese

356. High alloy steels have to be heated slowly and uniformly for hardening, to avoid
   a. scaling b. shrinkage
   c. warpage * d. segregation
   e. local hardening

357. Overheating high alloy steels when pack hardening must be avoided to prevent
   a. low hardness and shrinkage
   b. extreme hardness and brittleness
   c. distortion *
   d. scale formation
   e. warpage

358. A small selected portion of the job can be hardened by
   a. flame and induction hardening *
   b. pack hardening
   c. cyaniding
   d. nitriding
   e. case hardening

359. Which of the following is not the objective of annealing
   a. remove internal stresses
   b. refine grain size
   c. refine structure
   d. improve machinability *
   e. reduce softness

360. Which of the following is a case hardening process
   a. spherodising
   b. tempering
   c. sheradising
   d. cyaniding *
   e. parkerising

361. Which of the following is not the objective of nitriding
   a. increase surface hardness
   b. increase fatigue limit
   c. increase wear resistance
   d. refine grain size *
   e. none of the above

362. In normalising process, the hypoeutectoid steel is
   a. heated above A_3 line and cooled very slowly in furnace so as to refine old structure
   b. heated below A_1 line with a view to make steel ductile for cold working
   c. heated below A_1 line and cooled slowly with a view to remove internal stresses *
   d. heated above A_3 line and cooled in air resulting in slight hardening
   e. none of the above

363. A big advantage of surface hardening by nitriding process is that
   a. it is a mass production process
   b. it is simple and cheap
   c. parts need not be quenched *
   d. it does not require furnace
   e. there is no distortion of hardened parts

364. Martensite is the supersaturated solution of carbon in
   a. iron * b. steel
   c. alpha-iron d. beta-iron
   e. gamma-iron

365. Martensite is the structure obtained by
   a. quenching austenite
   b. quenching austenite and then heating in the range of 200 to 375^0C
   c. quenching austenite and then heating in the range of 375^0 to 660^0C *
   d. quenching austenite and then heating in the range of 600^0 to 700^0C
   e. none of the above

366. The rollers of a cycle chain are subjected to following type of stress
   a. compressive
   b. tensile
   c. bending
   d. fatigue *
   e. creep

367. Magnet steel contains high percentage of
   a. nickle
   b. aluminium
   c. cobalt
   d. copper
   e. tungsten *

368. Hardness of ferrite is of the order of
   a. 10 BHN
   b. 20 BNN
   c. 35 BHN
   d. 50 BHN *
   e. 75 BHN

369. The percentage of chromium in 18-4-1 HSS is
   a. 18% *
   b. 4%
   c. 1%
   d. 0.1%
   e. nil

370. Hardness of cementite is of the order of
   a. 100 BHN
   b. 600 BHN
   c. 1100 BHN
   d. 1400 BHN *
   e. 1950 BHN

371. Polymerisation is associated with
   a. stainless steel
   b. cast iron
   c. aluminium
   d. thermosplastic plastic *
   e. themosetting plastic

372. The most notable precipitation hardenable alloys are those in which the base metal is
   a. copper
   b. nickle *
   c. manganese
   d. aluminium
   e. magnesium

373. In order for an alloy system to be capable of precipitation hardening it is essential that the equilibrium diagram shows a decreasing solubility of one component in another
   a. constant temperature *
   b. with decreasing temperature
   c. with increasing temperature
   d. below room temperature
   e. at heat-treatment temperature

374. In structure, all metals are
   a. crystalline
   b. granular *
   c. wrought
   d. amorphous
   e. combinations of atoms and electrons

375. Which of the following is non-destructive test
   a. tensile test
   b. impact test
   c. charpy test
   d. cupping test
   e. radiography test *

376. High ratios of surface to mass tend to
   a. produce smaller depths of hardening
   b. produce greater depths of hardening
   c. have no effect on depth of hardening
   d. have unpredictability about depth of hardening *
   e. none of the above

377. Cast iron contains carbon
   a. $= 2\%$
   b. $< 0.8\%$
   c. $< 2\%$
   d. $> 2\%$ *
   e. $> 6.3\%$

378. Spherodite is the structure obtained by
   a. quenching austenite *
   b. quenching austenite and then heating into the range of 200 to 375^0C
   c. quenching austenite and then heating into the range of 375^0 to 660^0C
   d. quenching austenite and then heating into the range of 660 to 700^0C
   e. none of the above

379. The following structure is obtained by austempering process of heat treatment
   a. troostite
   b. martensite
   c. sorbite
   d. bainite *
   e. spherodite

380. White cast iron is produced by the following operation on grey cast iron
   a. rapid cooling
   b. slow cooling
   c. rapid heating *
   d. tempering
   e. bright polishing

381. The frequency of supply in induction hardening for heating surface of parts is proportional to
   a. its diameter (D)
   b. D^2
   c. $\frac{1}{D}$
   d. $\frac{1}{D^2}$ *
   e. $\sqrt{D}$.

382. Troostite is the structure obtained by
   a. quenching austenite
   b. quenching austenite and then heating into the range of 200 to 375^0C
   c. quenching austenite and then heating into the range of 375^0-660^0C
   d. quenching austenite and then heating into the range of 660^0 - 700^0C *
   e. none of the above

383. The process in which steel is coated with a thin layer of phosphate is known as
   a. phosphorous
   b. sheradising
   c. anodising
   d. parkerising *
   e. colorising

384. Steels are primarily designated according to
   a. iron content
   b. carbon content
   c. alloying elements *
   d. hardness
   e. tensile strength

385. The structure obtained by heating a steel above critical point and then quenching in water is
   a. martensite
   b. sorbite
   c. acicular *
   d. bainite
   e. spherodite

386. Sorbite is the structure obtained by
   a. quenching austenite *
   b. quenching austenite and then heating into the range of 200 to 375^0C
   c. quenching austenite and then heating into the range of 375^0 to 660^0C
   d. quenching austenite and then heating into the range of 600^0 to 700^0C
   e. none of the above

387. Toughness of a material means
   a. strength *
   b. machinability
   c. stress relieving
   d. softening
   e. all of the above

388. The constituents of Hayness stellite, having superior performance than HSS are
a. tungsten, chromium and vanadium
b. tungsten, chromium and cobalt *
c. tungsten, molybdenum and cobalt
d. cobalt, nickle and aluminium
e. chromium, manganese and cobalt

389. Line A_1 on iron-carbon diagram indicates
a. the beginning of transition from austenite to ferrite
b. completion of austenite transition to ferrite and pearlite *
c. limit of carbon solubility in austenite
d. all of the above
e. none of the above

390. Line A_{cm} on iron-carbon diagram indicates
a. the beginning of transition from austenite to ferrite
b. completion of austenite transition to ferrite and pearlite
c. limit of carbon solubility in austenite *
d. all of the above
e. none of the above

391. Line A_3 on iron-carbon diagram indicates
a. the beginning of transition from austenite to ferrite*
b. completion of austenite transition to ferrite and pearlite
c. limit of carbon solubility in austenite
d. all of the above
e. none of the above

392. Eutectoid composition of carbon steel at room temperature is known as
a. pearlite *
b. ferrite
c. cementite
d. martensite
e. none of the above

393. Grain size increases as temperature goes above A_2 line. Do these grains decrease in size when steel is cooled toward the A_3 line
a. yes
b. No *
c. will decrease if cooled fast
d. will increase if cooled fast
e. none of the above

394. The alloying element that could make steel austenitic at room temperature are
a. chromium and titanium
b. carbon and sulphur
c. nickle and manganese *
d. molybdenum and titanium
e. phosphorous and sulphur

395. The carbon content of the eutectoid with addition of alloying elements will
a. increase
b. decrease *
c. remain unaffected
d. increase or decrease depending on the alloying element
e. none of the above

396. When observed unetched, the carbon in gray cast iron appears in the form of
a. graphite *
b. cementite
c. ferrite
d. austenite
e. pearlite

397. Cementite in the form of lamellar pearlite appears as follows under microscope
a. dark *
b. white
c. light
d. finger print
e. none of the above

398. Cementite in white cast iron appears as follows under microscope
a. dark
b. white *
c. light
d. finger print
e. none of the above

399. Ferrite appears as follows under microscope
a. dark
b. white
c. light *
d. finger print
e. none of the above

400. Pearlite appears as follows under microscope
a. dark
b. white
c. light
d. finger print *
e. none of the above

401. The basic ingredient of cemented carbide is
a. aluminium oxide
b. vanadium
c. ceramics
d. tungsten oxide *
e. nonferrous cast alloy of cobalt, chromium etc.

402. Stellite is a nonferrous cast alloy composed of
a. cobalt, chromium and tungsten *
b. tungsten, chromium and vanadium
c. tungsten, molybdenum and cobalt
d. molybdenum, vanadium and cobalt
e. aluminium-oxide, tungsten oxide and some nonferrous materials

403. Materials exhibiting time bound behaviour are known as
a. visco elastic *
b. anelastic
c. isentropic
d. resilient
e. shock-proof

404. Visco elastic behaviour is common in
a. rubber
b. plastics
c. crystalline materials
d. non-crystalline materials
e. non-crystalline organic polymers *

405. Diamond's weight is expressed in terms of carats. One carat is equal to
a. 1 mg
b. 20 mg
c. 200 mg *
d. 350 mg
e. 500 mg

406. The degradation of plastics is accelerated by
a. high ambients
b. dampness
c. corrosive atmosphere
d. ultravoilet radiation *
e. sun rays

407. Which of the following metals can be easily drawn into wire
a. tin
b. copper *
c. lead
d. zinc
e. cast iron

408. Following element is added to molten cast iron to obtain nodular cast iron
a. Cr
b. Mn
c. Cu
d. Mo
e. Mg *

409. Silicon when added to copper increases its
a. machinability
b. brittleness
c. electrical conductivity
d. hardness and strength *
e. malleability

410. Which of the following is an amorphous material
a. mica
b. lead
c. rubber
d. glass *
e. plastic

411. Following etching solution is used for medium and high carbon steel, pearlite steel, and cast iron
a. nital -2% HNO_3 in ethyl alcohol
b. picral -5% picric acid and ethyl alcohol
c. 1% hydrofluoric acid in water
d. 50% NH_2 OH and 50% water *
e. none of the above

412. The strength is the ability of a material to resist
a. deformation under stress
b. externally applied forces with breakdown or yielding*
c. fracture due to high impact loads
d. none of these

413. The stiffness is the ability of a material to resist deformation under stress.
a. True * b. False

414. The ability of a material to resist fracture due to high impact load, is called
a. strength b. stiffness
c. toughness * d. brittleness

415. The property of a material which enables it to retain the deformation permanently, is called
a. brittleness b. ductility
c. malleability d. plasticity *

416. The ductility is the property of a material due to which it
a. can be drawn into wires *
b. breaks with little permanent distortion
c. can be rolled or hammered into thin sheets
d. can resist fracture due to high impact loads

417. The malleability is the property of a material due to which it can be rolled or hammered into thin sheets.
a. Agree * b. Disagree

418. Which of the following property is desirable for materials used in tools and machines ?
a. Elasticity * b. Plasticity
c. Ductility d. Malleability

419. The property of a material necessary for forgings, in stamping images on coins and in ornamental work, is
a. elasticity b. plasticity *
c. ductility d. malleability

420. Which of the following property is desirable in parts subjected to shock and impact loads ?
a. strength b. stiffness
c. Brittleness d. Toughness *

421. The property of a material essential for spring material is
a. stiffness b. ductility
c. resilience * d. plasticity

422. The toughness of a material .... when it is heated
a. remains same b. decreases *
c. increases

423. Which of the following material has maximum ductility ?
a. Mild steel * b. Copper
c. Nickel d. Aluminium

424. Brittle materials when subjected to tensile loads, snap off without giving any sensible elongation.
a. Yes * b. No

425. The property of a material due to which it breaks with little permanent distortion, is called
a. brittleness * b. ductility
c. malleability d. plasticity

426. The hardness is the property of a material due to which it
a. can be drawn into wires
b. breaks with little permanent distortion
c. can cut another metal *
d. can be rolled or hammered into thin sheets

427. Cast iron is a ductile material.
a. Right b. Wrong *

428. Which of the following material has maximum malleability ?
a. Lead * b. Soft steel
c. Wrought iron d. Copper

429. The ability of a material to absorb energy in the plastic range is called
a. resilience * b. creep
c. fatigue strength d. toughness

430. The malleability is the property of a material by virtue of which a material
a. regains its shape and size after the removal of external forces
b. retains the deformation produced under load permanently
c. can be drawn into wires with the application of a tensile force
d. can be rolled or hammered into thin sheets *

431. The ability of a material to undergo large permanent deformation with the application of a tensile force, is called ductility.
a. Correct * b. Incorrect

432. The stiffness is the ability of a material to resist
a. deformation under stress *
b. fracture due to high impact loads
c. externally applied forces with breakdown or yielding
d. none of the above

433. Iron ore is, usually, found in the form of
a. oxides b. carbonates
c. sulphides d. all of these *

434. The iron ore mostly used for the production of pig iron is
a. magnetite b. haematite *
c. limonite d. siderite

435. Haematite iron ore contains iron about
a. 30% b. 45%
c. 55% d. 70% *

436. Blast furnace is used to produce
a. pig iron * b. cast iron
c. wrought iron d. steel

437. Smelting is the process of
a. removing the impurities like clay, sand etc. from the iron ore by washing with water
b. expelling moisture, carbon dioxide, sulphur and arsenic from the iron ore by heating in shallow kilns
c. reducing the ore with carbon in the presence of a flux *
d. all of the above

438. The approximate height of a blast furnace is
a. 10 m b. 20 m
c. 30 m * d. 40 m

439. The maximum internal diameter of a blast furnace is about
a. 3 m b. 6 m
c. 9 m * d. 12 m

440. The portion of the blast furnace above its widest cross-section is called
a. hearth b. stack *
c. bosh d. throat

441. The portion of the blast furnace below its widest cross-section is called
a. hearth b. stack
c. bosh * d. throat

442. The charge of the blast furnace consists of
a. calcined ore (8 parts), coke (4 parts) and limestone (1 part) *
b. calcined ore (4 parts), coke (1 parts) and limestone (8 parts)
c. calcined ore (1 parts), coke (8 part) and limestone (4 parts)
d. calcined ore, coke and limestone all is equal parts

443. The charge is fed into the blast furnace through the
a. stack b. throat *
c. bosh d. tuyers

444. In the lower part of the blast furnace (zone of absorption), the temperature is
a. 400^0 to 700^0 C b. 800^0 C to 1000^0 C
c. 1200^0 to 1300^0 C * d. 1500^0 C to 1700^0 C

445. In the middle part of the blast furnace (zone of absorption), the temperature is
a. 400^0 to 700^0 C
b. 800^0 C to 1000^0 C *
c. 1200^0 to 1300^0 C
d. 1500^0 C to 1700^0 C

446. The temperature in the upper part of the blast furnace (zone of reduction) is .... that of the middle part.
a. equal to
b. less than *
c. more than

447. The fuel used in a blast furnace is
a. coal
b. coke *
c. wood
d. producer gas

448. The coke in the charge of blast furnace
a. controls the grade of pig iron
b. acts as an iron-bearing mineral
c. supplies heat to reduce ore and melt the iron *
d. forms a slag by combining with impurities

449. The iron ore in the charge of blast furnace acts as an iron bearing mineral.
a. True *
b. False

450. The limestone in the charge of a blast furnace decomposes to give lime and carbon dioxide. The lime thus obtained
a. controls the grade of pig iron
b. acts as an iron bearing mineral
c. supplies heat to reduce ore and melt the iron
d. forms a slag by combining with impurities *

451. The slag from the blast furnace
a. is used as a ballast for rail road
b. is mixed with tar for road making
c. consists of calcium, aluminium and ferrous silicates
d. all of the above *

452. In iron, the presence of carbon in free form is called graphite.
a. Agree *
b. Disagree

453. The carbon in the pig iron varies from
a. 0.1 to 0.5 %
b. 0.5 to 1 %
c. 1 to 5 % *
d. 5 to 10 %

454. The cupola is used to manufacture
a. pig iron
b. cast iron *
c. wrought iron
d. steel

455. Free carbon in iron makes the metal
a. soft and gives a coarse grained crystalline structure *
b. soft and gives a fine grained crystalline structure
c. hard and gives a coarse grained crystalline structure
d. hard and gives a fine grained crystalline structure

456. The percentage of carbon in cast iron varies from
a. 0.1 to 0.5
b. 0.5 to 1
c. 1 to 1.7
d. 1.7 to 4.5 *

457. Cast iron is manufactured in
a. blast furnace
b. cupola *
c. open hearth furnace
d. bessemer converter

458. Cast iron is a
a. blast furnace
b. malleable material
c. brittle material *
d. tough material

459. Cast iron is used in those parts which are subjected to shocks.
a. Right
b. Wrong *

460. Cast iron has
a. high compressive strength
b. excellent machinability
c. good casting characteristic
d. all of these *

461. The steel scrap added in the charge of cupola controls the grade of cast iron produced.
a. Correct *
b. Incorrect

462. The compressive strength of cast iron is .... that of its tensile strength.
a. equal to
b. less than
c. more than *

463. Silicon in cast iron
a. makes the iron soft and easily machinable *
b. increases hardness and brittleness
c. makes the iron white and hard
d. aids fusibility and fluidity

464. Sulphur in cast iron
a. makes the iron soft and easily machinable
b. increases hardness and brittleness *
c. makes the iron white and hard
d. aids fusibility and fluidity

465. Chilled cast iron is produced
a. by adding magnesium to molten cast iron
b. by quick cooling of molten cast iron *
c. from white cast iron by annealing process
d. none of these

466. White cast iron has a high tensile strength and a low compressive strength.
a. Yes *
b. No

467. Nodular cast iron is produced by adding .... to the molten cast iron.
a. nickel
b. chromium
c. copper
d. magnesium *

468. Malleable cast iron is produced
a. by adding magnesium to molten cast iron
b. by quick cooling of molten cast iron
c. from white cast iron by annealing process *
d. none of these

469. When elements like nickel, chromium, copper and molybdenum are added to the molten cast iron, it produces
   a. white cast iron b. nodular cast iron
   c. malleable cast iron d. alloy cast iron *

470. The addition of magnesium to cast iron increases its
   a. hardness
   b. ductility and strength in tension *
   c. corrosion resistance
   d. creep strength

471. Which of the following impurity in cast iron makes it hard and brittle ?
   a. Silicon b. Sulphur *
   c. Manganese d. Phosphorus

472. Grey cast iron has
   a. Carbon in the form of free graphite *
   b. high tensile strength
   c. low compressive strength
   d. all of these

473. When filing or machining cast iron makes our hands black, then it shows that .... is present in cast iron.
   a. cementite b. free graphite *

474. According to Indian standard specifications, cast iron designated by 'FG 150' means
   a. white cast iron with B.H.N. 150
   b. white cast iron with 150 MPa as minimum compressive strength
   c. grey cast iron with B.H.N. 150
   d. grey cast iron with 150 MPa as minimum tensile strength *

475. White cast iron has
   a. carbon in the form of carbide
   b. high tensile strength
   c. low compressive strength
   d. all of these *

476. According to Indian standard specifications, SG 400/15 means
   a. spheroidal graphite cast iron with B.H.N. 400 and minimum tensile strength 15 MPa
   b. spheroidal graphite cast iron with minimum tensile strength 400 MPa and 15 percent elongation *
   c. spheroidal graphite cast iron with minimum compressive strength 400 MPa and 15 percent reduction in area
   d. none of the above

477. Which of the following impurity in cast iron promotes graphite nodule formation and increases the fluidity of the molten metal ?
   a. Silicon * b. Sulphur
   c. Manganese d. Phosphorus

478. Which of the following statement is correct ?
   a. The product produced by blast furnace is called cast iron.
   b. The pig iron is the name given to the product produced by cupola.
   c. The cast iron has high tensile strength.
   d. The chilled cast iron has no graphite *

479. Grey cast iron is .... than white cast iron.
   a. softer * b. harder

480. Spheroidal grey cast iron has graphite flakes.
   a. True * b. False

481. Which of the following display properties similar to that of steel ?
   a. Blackheart cast iron b. Whiteheart cast iron
   c. both a. and b * d. none of these

482. For the pipe fitting like elbow, tee, union etc., which of the following is preferred ?
   a. Pig iron
   b. Malleable iron *
   c. Spheroidal graphite cast iron
   d. High carbon steel

483. The percentage carbon content in wrought iron is about
   a. 0.02 * b. 0.1
   c. 0.2 d. 0.4

484. Wrought iron
   a. is a ductile material
   b. can be easily forged or welded
   c. cannot stand sudden and excessive shocks
   d. all of these *

485. Steel containing upto 0.15 % carbon, is known as
   a. mild steel b. dead mild steel *
   c. medium carbon steel d. high carbon steel

486. Steel containing 0.8 to 1.5 % carbon, is known as
   a. mild steel b. dead mild steel
   c. medium carbon steel d. high carbon steel *

487. According to Indian standard specifications, a plain carbon steel designated by 40 C8 means that the carbon content is
   a. 0.04 % b. 0.35 to 0.45 % *
   c. 0.4 to 0.6 % d. 0.6 to 0.8 %

488. The brown smoke during the operation of a bessemer converter indicates that the
   a. air is burning out silicon and manganese *
   b. silicon and manganese has burnt and carbon has started oxidising
   c. the converter must be titled to remove the contents of the converter
   d. the brown smoke does not occur during the operation of a bessemer converter

489. The steel produced by cementation process is known as .... steel.
a. blister * b. crucible

490. During the operation of a bessemer converter, the white flame indicates that the silicon and manganese had burnt and carbon has started oxidising.
a. Agree * b. Disagree

491. The dieing down of a white flame during the operation of a bessemer converter indicates that the air is burning out silicon and manganese.
a. Yes b. No *

492. The red flame during the operation if a bessemer converter indicates that the
a. air is burning out silicon and manganese
b. silicon and manganese has burned out and carbon has started oxidising
c. converter must be tilted to remove the contents of the converter
d. red flame does not occur during the operation of a bessemer converter *

493. In acidic bessemer process, the furnace is lined with
a. silica bricks *
b. a mixture of tar and burnt dolomite bricks
c. either a. or b.
d. none of these

494. In basic bessemer process, the furnace is lined with
a. silica bricks
b. a mixture of tar and burnt dolomite bricks *
c. either a. or b.
d. none of these

495. The acidic bessemer process is suitable for producing steel from pig iron containing large quantities of phosphorus.
a. Right b. Wrong *

496. Which of the following process of steel making is in operation at Tata Iron and Steel Works, Jamshedpur ?
a. Bessember process
b. Open hearth process
c. Duplex process *
d. Electric process

497. Duplex process of steel making is a combination of
a. basic bessemer and acid open hearth processes
b. acid bessemer and basic open hearth processes *
c. acid bessemer and acid open hearth processes
d. basic bessemer and basic open hearth processes

498. The phosphorus and sulphur in steel making can be removed by using basic bessemer process.
a. Correct * b. Incorrect

499. The steel produced by bessemer or open hearth process is .... to that produced by L-D process
a. superior b. inferior *

500. The electric process of steel making is especially adopted to
a. alloy and carbon tool steel
b. magnet steel
c. high speed tool steel
d. all of these *

501. Which of the following steel making process is being adopted at Rourkela Steel Plant ?
a. Bessemer process
b. Open-hearth process
c. Electric process
d. L-D process *

502. Silicon is added in low carbon steels to
a. make the steel tougher and harder *
b. make the steel of good bending qualities
c. raise the yield point
d. all of these

503. Phosphorus is added in low carbon steels to raise its yield point
a. True * b. False

504. Manganese is added in low carbon steels to raise its yield point.
a. make the steel tougher and harder
b. raise the yield point
c. make the steel ductile and of good bending qualities*
d. all of the above

505. Which of the following is added in low carbon steels to prevent them from becoming porous ?
a. Sulphur b. Phosphorus
c. manganese d. Silicon *

506. In low carbon steels, ... raises the yield point and improves the resistance to atmospheric corrosion.
a. Sulphur b. Phosphorus *
c. manganese d. Silicon

507. Which of the following when used in ordinary low carbon steels, makes the metal ductile and of good bending qualities ?
a. Sulphur b. Phosphorus
c. manganese * d. Silicon

508. In low carbon steels, presence of small quantities of sulphur improves
a. weldability b. formability
c. machinability * d. hardenability

509. A carbon steel having Brinell hardness number 100 should have ultimate tensile strength closer to
a. 100 N/mm^2 b. 200 N/mm^2
c. 350 N/mm^2 * d. 1000 N/mm^2

510. A steel alloy containing 36 % nickel is called
a. stainless steel b. high speed steel
c. invar * d. heat resisting steel

511. The material widely used for making pendulums of clocks is
a. stainless steel b. high speed steel
c. heat resisting steel d. nickel steel *

512. In high speed steels, manganese is used to tougher the metal and to increase its
a. yield point
b. critical temperature *
c. melting point
d. hardness

513. The steel widely used for making precision measuring instruments is
a. nickel steel *
b. nickel-chrome steel
c. high speed steel
d. chrome-vanadium steel

514. A small percentage of boron is added to steel in order to
a. increase hardenability *
b. reduce machinability
c. increase wear resistance
d. increase endurance strength

515. Which of the following material has nearly zero coefficient of expansion ?
a. Stainless steel b. High speed steel
c. Invar * d. Heat resisting steel

516. Chromium when added to steel .... the tensile strength.
a. does not effect
b. decreases
c. increases *

517. Vanadium when added to steel
a. increases tensile strength *
b. decreases tensile strength
c. raises critical temperature
d. lowers critical temperature

518. Tungsten when added to steel .... the critical temperature.
a. does not effect b. lowers
c. raises *

519. The machinability of steel is improved by adding
a. nickel
b. chromium
c. nickel and chromium
d. sulphur, lead and phosphorus *

520. The presence of hydrogen in steel causes
a. reduced neutron absorption cross-section
b. improved weldability
c. embrittlement *
d. corrosion resistance

521. Corrosion resistance of steel is increased by adding nickel and chromium.
a. Yes * b. No

522. Hardness of steel is increased by adding sulphur, lead and phosphorus.
a. Yes b. No *

523. Shock resistance of steel is increased by adding
a. nickel
b. chromium
c. nickel and chromium *
d. sulphur, lead ad phosphorus

524. The steel widely used for motor car crankshafts is
a. nickel steel b. chrome steel *
c. nickel-chrome steel d. silicon steel

525. The silicon steel is widely used for
a. connecting rods
b. cutting tools
c. generators and transformers in the form of laminated cores *
d. motor car crankshafts

526. The cutting tools are made from
a. nickel steel b. chrome steel
c. nickel-chrome steel d. high speed steel *

527. Which of the following gives the correct order of increasing hot hardness of cutting tool materials ?
a. Diamond, Carbide, High speed steel
b. Carbide, Diamond, High speed steel
c. High speed steel, Carbide, Diamond *
d. High speed steel, Diamond, Carbide

528. Killed steels
a. have minimum impurity level
b. are produced by L-D process
c. have almost zero percentage of phosphorus and sulphur
d. are free from oxygen *

529. An alloy steel which is work hardenable and which is used to make the blades of bulldozers, bucket wheel excavators and other earth moving equipment contain iron, carbon and
a. chromium b. silicon
c. manganese * d. magnesium

530. Connecting rod is, usually, made from
a. low carbon steel b. high carbon steel
c. medium carbon steel * d. high speed steel

531. The alloying element which can replace tungsten in high speed steels is
a. nickel b. vanadium
c. cobalt d. molybdenum *

532. Free cutting steels
 a. contain carbon in free from
 b. require minimum cutting force
 c. is used where rapid machining is the prime requirement *
 d. can be cut freely.

533. Ball bearings, are usually, made from
 a. low carbon steel b. high carbon steel
 c. medium carbon steel d. chrome steel *

534. Shock resisting steels should have
 a. low wear resistance b. low hardness
 c. low tensile strength d. toughness *

535. The alloy, mainly used for corrosion resistance in stainless steels is
 a. silicon b. manganese
 c. carbon d. chromium *

536. The nuts and bolts are made from silicon steel.
 a. Right b. Wrong *

537. The alloying element which reduces the formation of iron sulphide in steel is
 a. chromium b. nickel
 c. vanadium d. manganese *

538. The alloying element which increases residual magnetism and coercive magnetic force in steel for magnets is
 a. chromium b. nickel
 c. vanadium d. cobalt *

539. The main alloying elements high speed steel in order of increasing proportion are
 a. vanadium, chromium, tungsten *
 b. tungsten, titanium, vanadium
 c. chromium, titanium, vanadium
 d. tungsten, chromium, titanium

540. The blade of a power saw is made of
 a. boron steel b. high speed steel *
 c. stainless steel d. malleable cast iron

541. In high speed steels, vanadium adds to the property of red hardness and tungsten and chromium add to high resistance.
 a. True * b. False

542. The high speed steel has .... percentage of tungsten.
 a. maximum * b. minimum

543. 18-4-1 high speed steel contains
 a. vanadium 4 %, chromium 18% and tungsten 1 %
 b. vanadium 1 %, chromium 4 % and tungsten 18 %*
 c. vanadium 18 %, chromium 1% and tungsten 4 %
 d. none of the above

544. A steel containing 12 to 14 % chromium and 0.12 to 0.35 % carbon is called martensitic stainless steel.
 a. True *
 b. False

545. A steel containing 16 to 18 % nickel and about 0.12 % carbon is called
 a. ferritic stainless steel *
 b. austenitic stainless steel
 c. martensitic stainless steel
 d. Nickel steel

546. The austenitic stainless steel contains
 a. 18% chromium and 8 % nickel *
 b. 8% chromium and 18% nickel
 c. 14% chromium and 0.35% carbon
 d. 14% nickel and 0.35% carbon

547. The type of steel is given in Group A. Match the correct product given in Group B.

Group A (Type of steel)	Group B (Product)
a. Mild steel	A. Screw driver
b. Tool steel	B. Commercial beams
c. Medium carbon steel	C. Crane hooks
d. High carbon steel	D. Blanking dies

548. 18/8 stainless steel consists of
 a. 18% nickel and 8% chromium
 b. 18% chromium and 8% Nickel *
 c. 18% nickel and 18% chromium
 d. 8% nickel and 8% chromium

549. The material in which the atoms are arranged chaotically, is called
 a. amorphous material *
 b. mesomorphous material
 c. crystalline material
 d. none of these

550. The material in which the atoms are arranged regularly in some directions but not in others, is called
 a. amorphous material
 b. mesomorphous material *
 c. crystalline material
 d. none of these

551. In a crystalline material, atoms are arranged regularly in definite and orderly manner & form
 a. Agree *
 b. Disagree

552. Which of the following is an amorphous material ?
 a. Mica b. Silver
 c. Lead d. Glass *

553. Which of the following is a mesomorphous material ?
 a. Mica * b. Silver
 c. Lead d. Brass

554. The unit cells
   a. contain the smallest number of atoms which when taken together have all the properties of the crystals of the particular metal
   b. have the same orientation and their similar faces are parallel
   c. may be defined as the smallest parallelopiped which could be transposed in three coordinate directions to build up the space lattice
   d. all of the above *

555. In a unit cell of a body centred cubic space lattice, there are .... atoms.
   a. six b. nine *
   c. fourteen d. seventeen

556. There are fourteen atoms in a unit cell of
   a. body centred cubic space lattice
   b. face centred cubic space lattice *
   c. close packed hexagonal space lattice
   d. none of these

557. In a unit cell of close packed hexagonal space lattice, there are twenty four atoms.
   a. Right b. Wrong *

558. In a face centred cubic space lattice, there are
   a. nine atoms out of which eight atoms are located at the corners of the cube and one atom at its centre
   b. fourteen atoms out of which eight atoms are located at the corners of the cube and six atoms at the centres of six faces *
   c. seventeen atoms out of which twelve atoms are located at the twelve corners of the hexagonal prism, one atom at the centre of each of the two hexagonal faces and three atoms are symmetrically arranged in the body of the cell
   d. none of the above

559. In a body centred cubic space lattice, there are nine atoms out of which eight atoms are located at the corners of the cube and one atom at its centre.
   a. Yes * b. No

560. In a close packed hexagonal space lattice, there are
   a. nine atoms out of which eight atoms are located at the corners of the cube and one atom at its centre
   b. twelve atoms, all of which are located at the twelve corners of a hexagonal prism
   c. fourteen atoms out of which eight atoms are located at the corners of the cube and six atoms at the centres of six faces
   d. none of the above *

561. The type of space lattice found in alpha-iron is
   a. face centred cubic space lattice
   b. body centred cubic space lattice *
   c. close packed hexagonal space lattice
   d. none of these

562. The type of space lattice found in gamma-iron is
   a. face centred cubic space lattice *
   b. body centred cubic space lattice
   c. close packed hexagonal space lattice
   d. none of these

563. Body centred cubic space lattice is found in
   a. zinc, magnesium, cobalt, cadmium, antimony and bismuth
   b. gamma-iron, aluminium, copper, lead , silver and nickel
   c. alpha-iron, tungsten, chromium and molybdenum*
   d. none of the above

564. Face centred cubic space lattice is found in gamma-iron, aluminium, copper, lead, silver and nickel
   a. True * b. False

565. Closed packed hexagonal space lattice is found in
   a. zinc, magnesium, cobalt, cadmium, antimony and bismuth *
   b. gamma-iron, aluminium, copper, lead, silver and nickel
   c. alpha-iron, tungsten, chromium and molybdenum
   d. none of the above

566. The coordination number of a face centred cubic space lattice is
   a. six b. twelve *
   c. eighteen d. twenty

567. The ratio of the volume occupied by the atoms to the total volume of the unit cell is called
   a. coordination number
   b. atomic packing factor *
   c. space lattice
   d. none of these

568. The bond formed by transferring electrons from one atom to another is called
   a. Ionic Bond * b. Covalent Bond
   c. Metallic Bond d. None of these

569. Which of the following solids are malleable and ductile ?
   a. Ionic solids b. Covalent solids
   c. Metallic solids * d. none of these

570. The defect which takes place due to imperfect packing of atoms during crystallisation is known as
   a. line defect b. surface defect
   c. point defect * d. none of these

571. Which of the following is a point imperfection ?
   a. Vacancy
   b. Interstitial imperfection
   c. Frenkel imperfection
   d. all of these *

572. Dye penetrant method is generally used to locate
   a. core defects b. surface defects *
   c. superficial defects d. temporary defects

573. Which of the following statement is true about brittle fracture ?
   a. High temperature and low strain rates favour brittle fracture
   b. Many metals hexagonal closed packed (H.C.P.) crystal structure commonly show brittle fracture *
   c. Brittle fracture is always preceded by noise
   d. Cup and cone formation is characteristic for brittle materials

574. Specify the sequence correctly
   a. Grain growth, recrystallisation, stress relief
   b. Stress relief, grain growth, recrystallisation
   c. Stress relief, recrystallisation, grain growth *
   d. Grain growth, stress relief, recrystallisation

575. Macro-structure of a material is, generally, examined by
   a. naked eye * b. optical microscope
   c. metallurgical microscope d. X-ray techniques

576. Micro-structure of a material is, generally, examined by
   a. naked eye b. optical microscope
   c. X-ray techniques d. none of these *

577. Crystal structure of a material is, generally, examined by
   a. haked eye b. optical microscope
   c. metallurgical microscope d. X-ray techniques *

578. When a low carbon steel is heated upto upper critical temperature
   a. there is no change in grain size
   b. the average grain size is a minimum *
   c. there grain size increases very rapidly
   d. the grain size first increases and then decreases very rapidly

579. When a medium carbon steel is heated to coarsening temperature,
   a. there is no change in grain size
   b. the average grain size
   c. the grain size increases very rapidly *
   d. the grain size first increase and then decreases very rapidly.

580. When a low carbon steel is heated upto lower critical temperature,
   a. there is no change in grain size *
   b. the average grain size is a minimum
   c. the grain size increases very rapidly
   d. the grain size first increases and then decreases very rapidly

581. The quenching of steel from the upper critical point results in a fine grained structure.
   a. Agree * b. Disagree

582. The slow cooling of steel from the .... results in a coarse grained structure.
   a. lower critical point b upper critical point *

583. A material is said to be allotropic, if it has
   a. fixed structure at all temperature
   b. atoms distributed in random pattern
   c. different crystal structures at different temperatures*
   d. any one of the above

584. A fine grained steel
   a. is less tough and has a greater tendency to distort during heat treatment
   b. is more ductile and has a less tendency to distort during heat treatment *
   c. is less tough and has a less tendency to distort heat treatment
   d. is more ductile and has a greater tendency to distort during heat treatment

585. A coarse grained steel
   a. is less tough and has a greater tendency to distort during heat treatment *
   b. is more ductile and has a less tendency to distort during heat treatment
   c. is less tough and has a less tendency to distort during heat treatment
   d. is more ductile and has a greater tendency to distort during heat treatment

586. Which of the following iron exists at 910^0 C ?
   a. α - iron * b. β - iron
   c. γ - iron d. δ - iron

587. Which of the following iron exist between 910^0 C and 1403^0 C ?
   a. α - iron b. β - iron
   c. γ - iron * d. δ - iron

588. The delta-iron possesses a body centred cubic space lattice.
   a. Correct * b. Incorrect

589. Pearlite is a combination of 87% ferrite and 13% cementite.
   a. Yes * b. No

590. The hardness of steel depends upon the
   a. amount of cementite it contains *
   b. amount of carbon it contains
   c. contents of alloying elements
   d. method of manufacture of steel

591. The hardness of steel increases if it contains
   a. pearlite b. ferrite
   c. cementite * d. martensite

592. A steel with 0.8% carbon is known as
   a. eutectoid steel *
   b. hyper-eutectoid steel
   c. hypo-eutectoid steel
   d. none of these

593. Eutectoid reaction occurs at
a. 600^0C b. 723^0C *
c. 1147^0C d. 1493^0C

594. A steel with carbon .... is known as hypo-eutectoid steel
a. 0.8% b. below 0.8% *
c. above 0.8%

595. A steel with carbon above 0.8% is known as hyper-eutectoid steel.
a. Agree * b. Disagree

596. The lower critical temperature
a. decreases as the carbon content in steel increases
b. increases as the carbon content in steel increases
c. is same for all steels *
d. depends upon the rate of heating

597. Gamma-iron occurs between the temperature range of
a. 400^0 C to 600^0 C b. 600^0 to 900^0 C
c. 900^0 C to 1400^0 C * d. 1400^0 to 1530^0 C

598. Delta-iron occurs between the temperature range of
a. 400^0 C to 600^0 C
b. 600^0 to 900^0 C
c. 900^0 C to 1400^0 C
d. 1400^0 to 1530^0 C *

599. The temperature point at which the change starts on heating the steel is called
a. lower critical point *
b. upper critical point
c. point of recalescence
d. point of decalescence

600. The temperature point at which the change ends on heating the steel is called
a. lower critical point
b. upper critical point *
c. point of recalescence
d. point of decalescence

601. The lower critical point for all steels is
a. 600^0C b. 700^0C
c. 723^0* d. 913^0C

602. The upper critical point varies according to the carbon content in steel.
a. True * b. False

603. For a steel containing 0.8% carbon
a. there is no critical point
b. there is only one critical point *
c. there are two critical point
d. there can be any number of critical points

604. The essential constituent of a hardened steel is
a. pearlite b. austenite
c. martensite * d. troostite

605. Iron-carbon alloys containing 1.7 to 4.3 % carbon are known as
a. eutectic cast irons
b. hypo-eutectic cast irons *
c. hyper-eutectic cast irons
d. none of these

606. Iron-carbon alloys containing 4.3% carbon are known as hypo-eutectic cast irons.
a. Right b. Wrong *

607. Iron-carbon alloys containing carbon .... 4.3% are known as hyper-eutectic cast irons.
a. equal to b. less than
c. more than *

608. A steel with 0.8% carbon and 100% pearlite is called
a. eutectoid steel *
b. hypo-eutectoid steel
c. hyper-eutectoid steel
d. none of these

609. An eutectoid steel consists of
a. wholly pearlite *
b. wholly austenite
c. pearlite and ferrite
d. pearlite and cementite

610. Pearlite consists of
a. 13% carbon and 87% ferrite
b. 13% cementite and 87% ferrite *
c. 13% ferrite and 87% cementite
d. 6.67% carbon and 93.33% iron

611. Cementite consist of
a. 13% carbon and 87% ferrite
b. 13% cementite and 87% ferrite
c. 13% ferrite and 87% cementite
d. 6.67% carbon and 93.33% iron *

612. Match the correct percentage of carbon given in Group B for the type of material given in Group A.

Group A (Material)		Group B (Carbon percentage)
a. Hypo-eutectoid steel	A.	4.3 - 6.67
b. Hyper-eutectoid steel	B.	1.7 - 4.3
c. Hypo-eutectoid cast iron	C.	0.8 - 2.0
d. Hyper-eutectoid cast iron	D.	0.008 - 0.8

613. Which one of the following sets of constituents is expected in equilibrium cooling of a hyper- eutectoid steel from austenitic state ?
a. Ferrite and pearlite
b. Cementite and pearlite *
c. Ferrite and bainite
d. Cementite and martensite

614. When a steel containing less than 0.8 % carbon is cooled slowly from temperature above or within the critical range, it consists of
a. mainly ferrite b. mainly pearlite
c. ferrite and pearlite * d. pearlite and cementite

615. When a steel containing .... 0.8% carbon is cooled slowly below the lower critical point, it consists of ferrite and pearlite.
   a. equal to   b. less than *
   c. more than

616. When a steel containing more than 0.8% carbon is cooled slowly below the lower critical point, it consists of
   a. mainly pearlite
   b. mainly ferrite
   c. ferrite and pearlite
   d. pearlite and cementite *

617. The austentite is a solid solutions of carbon or iron carbide in gamma-iron.
   a. Correct *   b. Incorrect

618. The maximum solubility of carbon in austenite is 1.7% at 1130^0 C.
   a. Yes *   b. No

619. Which of the following statement is wrong ?
   a. A steel with 0.8% carbon is wholly pearlite
   b. The amount of cementite increases with the increase in percentage of carbon in iron.
   c. A mechanical mixture of 87% cementite and 13% ferrite is called pearlite.*
   d. The cementite is identified as round particles in the structure.

620. A steel containing ferrite and pearlite is
   a. hard   b. soft *
   c. tough   d. hard and tough

621. The purpose of heat treatment is to
   a. relieve the stresses set up in the material after hot or cold working
   b. modify the structure of the material
   c. change grain size
   d. any one of these *

622. Normalising of steel is done to
   a. refine the grain structure
   b. remove strains caused by cold working
   c. remove dislocations caused in the material structure due to hot working
   d. all of the above *

623. In normalising process, the hypo-eutectoid steel is heated from 30^0 C to 50^0 C above the upper critical temperature and then cooled in still air.
   a. True *   b. False

624. Which of the following statements are true for annealing steels ?
   a. Steels are heated to 500^0 to 700^0 C
   b. Cooling is done slowly and steadily
   c. Internal stresses are relieved
   d. all of these *

625. The temperature required for full annealing in hyper-eutectoid steel is
   a. 30^0 C to 50^0 C above upper critical temperature
   b. 30^0 C to 50^0 C below upper critical temperature
   c. 30^0 C to 50^0 C above lower critical temperature *
   d. 30^0 C to 50^0 C below lower critical temperature

626. In full annealing, the hypo-eutectoid steel is heated from 30^0 C to 50^0 C above the upper critical temperature and then cooled
   a. in still air
   b. slowly in the furnace *
   c. suddenly in a suitable cooling medium
   d. any one of these

627. In process annealing, the hypo-eutectoid steel is
   a. heated from 30^0 C to 50^0 C above upper critical temperature and then cooled in still air
   b. heated from 30^0 C to 50^0 C above upper critical temperature and then cooled suddenly in a suitable medium
   c. heated from 30^0 C to 50^0 C above upper critical temperature and then cooled slowly in the furnace
   d. heated below or close to the lower critical temperature and then cooled slowly *

628. In spheroidising process, the steel is
   a. heated below the lower critical temperature and then cooled slowly
   b. heated upto the lower critical temperature and then cooled in still air
   c. heated slightly above the lower critical temperature and then cooled slowly to a temperature of 600^0 C*
   d. none of the above

629. In a hardening process, the hypo-eutectoid steel is
   a. heated from 30^0 C to 50^0 C above upper critical temperature and then cooled in still air
   b. heated from 30^0 C to 50^0 C above upper critical temperature and then cooled suddenly in a suitable cooling medium *
   c. 30^0 C to 50^0 C above upper critical temperature and then cooled slowly in the furnace
   d. heated below or close to the lower critical temperature and then closed slowly

630. The process which improves the machinability of steels, but lowers the hardness and tensile strength, is
   a. normalising
   b. full annealing
   c. process annealing
   d. spheroidising *

631. The hardness and tensile strength in austenitic stainless steel can be increased by
   a. hardening and cold working *
   b. normalising
   c. martempering
   d. full annealing

632. The process used for relieving the internal stress previously set up in the metal and for increasing the machinability of steel, is
a. normalising b. full annealing
c. process annealing * d. spheroidising

633. When the steel is normalised, its
a. yield point increases
b. ductility decreases
c. ultimate tensile strength increases
d. all of these *

634. Which of the following statement is wrong ?
a. The spheroidising process is usually applied to high carbon tool steels which are difficult to machine.
b. In spheroidising process, the cementite in the granular form is produced in the structure of steel
c. The annealing process causes complete recrystallization in steels which have been severely cold worked and a new grain structure is formed.
d. none of the above *

635. Ferrite and pearlite makes the steel soft and ductile.
a. Agree * b. Disagree

636. A steel is heated at about 875^0 C where the structure consists of entirely austentite. It is then cooled suddenly at a temperature of about 250^0 C to 525^0 C. This process of heat treatment is known as
a. normalising b. annealing
c. austempering * d. martempering

637. In the austempering process of heat treatment, austenite changes into
a. martensite b. troostite
c. sorbite d. bainite *

638. Martensite has needle like structure and is magnetic.
a. Correct * b. Incorrect

639. The heat treatment process used for castings is
a. carburising b. normalising *
c. annealing d. tempering

640. The heat treatment process used for softening hardened steel is
a. carburising b. normalising
c. annealing d. tempering *

641. In induction hardening .... is high
a. current b. voltage
c. frequency * d. temperature

642. In induction hardening, the depth of hardening is controlled by controlling the voltage.
a. Right * b. Wrong

643. In flame hardening, oxy-acetylene flame is used.
a. Yes * b. No

644. Which of the following is a case hardening process ?
a. Carburising b. Cyaniding
c. Nitriding d. All of these *

645. The process of inducing carbon to .... carbon steels in order to give it a hard surface is known as carburising.
a. low * b. medium
c. high

646. The process in which carbon and nitrogen both are absorbed by the metal surface to get it hardened is known as
a. carburising
b. cyaniding *
c. flame hardening
d. induction hardening

647. Quenching is not necessary when hardening is done by
a. case hardening b. flame hardening
c. nitriding * d. any one of these

648. Which of the following generally decreases in the steel after quench-hardening ?
a. Brittleness
b. Percentage elongation *
c. Impact strength
d. none of these

649. Induction hardening is basically a
a. carburising process
b. surface hardening process *
c. core-hardening process
d. none of these

650. Match the correct answer from Group B for the heat treatment processes given in Group A.

Group A (Heat treatment process)	Group B (Effect on the properties)
a. Annealing	A. Refined grain structure
b. Nitriding	B. Improves the hardness of the whole mass
c. Martempering	C. Increases surface hardness
d. Normalising	D. Improves ductility

651. The machine tool guide ways are usually hardened by
a. vacuum hardening b. martempering
c. induction hardening d. flame hardening *

652. Age hardening is related to
a. duralumin * b. brass
c. copper d. silver

653. An aluminium alloy with 11% silicon is used for making engine pistons by die casting technique.
a. Yes * b. No

654. Duralumin contains
   a. 3.5 to 4.5% copper, 0.4 to 0.7% magnesium, 0.4 to 0.7% manganese and rest aluminium *
   b. 3.5 to 4.5% copper, 1.2 to 1.7% managanese, 1.8 to 2.3% nickel, 0.6% each of silicon, magnesium and iron, and rest aluminium
   c. 4 to 4.5% magnesium, 3 to 4% copper and rest aluminium
   d. 5 to 6% tin, 2 to 3% copper and rest aluminium

655. Which of the following statement is incorrect about duralumin ?
   a. It is prone to age hardening
   b. It can be forged
   c. It has good machining properties
   d. It is lighter than pure aluminium *

656. Y-alloy contains
   a. 3.5 to 4.5% copper, 0.4 to 0.7% magnesium, 0.4 to 0.7% manganese and rest aluminium
   b. 3.5 to 4.5% copper, 1.2 to 1.7% managanese, 1.8 to 2.3% nickel, 0.6% each of silicon, magnesium and iron, and rest aluminium *
   c. 4 to 4.5% magnesium, 3 to 4% copper and rest aluminium
   d. 5 to 6% tin, 2 to 3% copper and rest aluminium

657. The aluminium alloy, mainly used, for anodized utensil manufacture, is
   a. duralumin　b. Y-alloy
   c. magnalium　d. hindalium *

658. Aluminium has low density and addition of silicon improves its fluidity and therefore, its castability
   a. Correct *　b. Incorrect

659. Duralumin has better strength than Y-alloy at high temperature.
   a. True　b. False *

660. The aluminium alloy made by melting aluminium with 2 to 10% magnesium and 1.75% copper is called
   a. duralumin　b. Y-alloy
   c. magnalium *　d. hindalium

661. The machinability of aluminium increases when .... is added to aluminium.
   a. copper　b. magnesium
   c. silicon　d. lead and bismuth *

662. The casting ability of aluminium increases when .... is added to aluminium.
   a. copper　b. magnesium
   c. silicon *　d. lead and bismuth

663. The addition of manganese to aluminium improves corrosion resistance.
   a. Right *　b. Wrong

664. Hindalium is an alloy of aluminium and magnesium with a small quantity of chromium.
   a. Agree *　b. Disagree

665. Brass is an alloy of
   a. copper and zinc *　b. copper and tin
   c. copper, tin and zinc　d. none of these

666. Cartidge brass can be
   a. cold rolled into sheets　b. drawn into wires
   c. formed into tube　d. any one of these *

667. Bronze is an alloy of
   a. copper and zinc　b. copper and tin *
   c. copper, tin and zinc　d. none of these

668. An alloy of copper, tin and zinc is known as
   a. brass　b. bronze
   c. gun metal *　d. muntz metal

669. Muntz metal (Yellow brass) contains
   a. 70% copper and 30% zinc
   b. 60% copper and 40% zinc *
   c. 59% copper, 40% zinc and 1% tin
   d. 60.45% copper, 35.2% zinc and 5.35% nickel

670. German silver contains
   a. 70% copper, 30% zinc
   b. 60% copper and 40% zinc
   c. 59% copper, 40% zinc and 1% tin
   d. 60.45% copper, 35.2% zinc and 5.35% nickel *

671. The addition of copper to aluminium possess maximum strength after heat treatment and age-hardening
   a. Correct *　b. Incorrect

672. In corrosion resistant properties, bronzes are .... to brasses.
   a. superior *　b. inferior

673. The addition of which of the following improves machining of copper ?
   a. Sulphur *　b. Vanadium
   c. Tin　d. Zinc

674. Silicon when added to copper improves
   a. machinability　b. hardness
   c. hardness & strength *　d. strength & ductility

675. Nickel when added to copper improves
   a. machinability　b. hardness *
   c. hardness and strength　d. strength & ductility

676. Beryllium bronze contains
   a. 60% copper and 40% beryllium
   b. 80% copper and 20% beryllium
   c. 97.75% copper and 2.25% beryllium *
   d. 99% copper and 1% beryllium

677. Silicon bronze contains
   a. 60% copper, 35% zinc and 5% manganese
   b. 88% copper, 10% tin and 2% zinc
   c. 96% copper, 3% silicon and 1% manganese *
   d. 76% copper, 20% silicon and 4% zinc

678. Manganese bronze contains more copper than silicon bronze.
a. Yes b. No *

679. Babbit metal is a
a. lead-base alloy b. copper-base alloy
c. tin-base alloy * d. cadmium-base alloy

680. Which of the following has a fine gold colour and is used for imitation jewellery ?
a. Silicon bronze b. Aluminium bronze*
c. Gun metal d. Babbit metal

681. Admirality gun metal contains
a. 60% copper, 35% zinc and 5% manganese
b. 76% copper, 20% silicon and 4% zinc
c. 82% copper, 12% zinc and 6% manganese
d. 88% copper, 10% tin and 2% zinc *

682. Babbit metal contains
a. 50% tin and 50% antimony
b. 66% tin, 30% copper and 4% antimony
c. 88% tin, 4% copper and 8% antimony *
d. 92% tin, 6% copper and 2% antimony

683. German silver contains
a. 1% silver b. 2% silver
c. 5% silver d. no silver *

684. Which of the following metal shrinks most from molten state to solid state ?
a. Cast iron b. Cast steel
c. Brass d. Admirality Metal *

685. Tin base white metals are used where the bearings are subjected to
a. large surface wear *
b. elevated temperature
c. light load and pressure
d. high pressure and load

686. The metal suitable for bearings subjected to light loads, is
a. silicon bronze b. white metal
c. monel metal d. phosphor bronze *

687. The metal suitable for bearings subjected to heavy loads, is
a. silicon bronze b. white metal *
c. monel metal d. phosphor bronze

688. Phosphor bronze has
a. high resistance to corrosion
b. good wearing qualities and high elasticity *
c. valuable cold working property
d. all of these

689. The percentage of phosphorus is phosphor bronze is
a. 0.1 * b. 1
c. 11.1 d. 98

690. Beryllium bronze has
a. high yield point b. high fatigue limit
c. both a. and b.* d. none of these

691. Aluminium bronze has high resistance to corrosion.
a. True b. False *

692. Monel metal is an alloy of
a. nickel and copper
b. nickel and chromium
c. nickel, chromium and iron *
d. copper and chromium

693. Monel metal is an alloy of
a. nickel and copper *
b. nickel and chromium
c. nickel, chromium and iron
d. copper and chromium

694. Monel metal contains
a. 65% nickel, 15% chromium and 20% iron
b. 68% nickel, 29% copper and 3% other constituents*
c. 80% nickel and 20% chromium
d. 80% nickel, 14% chromium and 6% iron

695. Inconel contains
a. 65% nickel, 15% chromium and 20% iron
b. 68% nickel, 29% copper and 3% other constituents
c. 80% nickel and 20% chromium
d. 80% nickel, 14% chromium and 6% iron *

696. Nichrome contains more iron than Inconel.
a. Agree * b. Disagree

697. Nimonic contains .... percentage of nickel as that of Inconel.
a. same * b. less
c. more

698. Which of the following metal is used in making electrical resistance wire for electric furnaces and heating elements ?
a. Babbit metal b. Monel metal
c. Nichrome * d. Phosphor bronze

699. Incoloy, Hastelloy and Vitallium are .... temperature alloys.
a. high * b. low

700. Which of the following metal is used for nuclear energy ?
a. Uranium b. Thorium
c. Niobium d. all of these *

701. Thermosetting plastics are those materials which
a. are formed into shape under heat and pressure and results in a permanently hard product *
b. do not become hard with the application of heat and pressure and no chemical change occurs
c. are flexible and can withstand considerable wear under suitable conditions
d. are used as a friction lining for clutches and brakes

702. Thermoplastic materials are those materials which
   a. are formed into shape under heat and pressure and results in a permanently hard product
   b. do not become hard with the application of heat and pressure and no chemical change occurs *
   c. are flexible and can withstand considerable wear under suitable conditions
   d. are used as a friction lining for clutches and brakes

703. Thermosetting plastics are
   a. moulded by heating and cooling *
   b. formed by condensation polymerisation
   c. softened on hearting and hardened on cooling for any number of times
   d. none of the above

704. Polyvinylchloride (PVC) is a .... material
   a. thermoplastic *   b. thermosetting

705. The catalysts are used to accelerate the chemical reaction during the process of ploymerisation of plastics
   a. True *   b. False

706. Within elastic limits
   a. Load is less
   b. Load is gradually applied
   c. Load is static
   d. Deformation is proportional to the load *
   e. Deformation is permanent.

707. A body which is permanently deformed is said to have undergone
   a. Elastic deformation
   b. Limit of elastic deformation
   c. Uniform deformation *
   d. Non-uniform deformation
   e. None of the above.

708. According to Hooke's law
   a. Stress is proportional to strain
   b. Stress/strain is constant
   c. Average stress is proportional to average strain
   d. Within elastic limits average stress is proportional to average strain *
   e. None of the above.

709. Identify the correct statement
   a. All materials undergo plastic deformation
   b. A completely brittle material would not fracture at elastic limit
   c. Brittleness is an important engineering consideration, because it allows the materials to redistribute localized stresses
   d. In elastic materials yield stress and tensile strength are practically identical
   e. A metal which is brittle in tension may be ductile under hydrostatic compression.*

710. A body which does not contain voids or empty spaces is known as
   a. Continuous body *   b. An isotropic body
   c. Heterogeneous body   d. Crystalline body
   e. None of above.

711. The limiting load beyond which the material no longer behaves elastically is known is
   a. Breaking load   b. Limiting load
   c. Load bearing capacity
   d. Plastic limit   e. Elastic limit.*

712. Identify the correct statement
   a. A metal which is brittle in tension at room temperature can become ductile in the presence of notches.
   b. A metal which is brittle in tension at room temperature can become ductile in the presence of embrittlement agents such as hydrogen
   c. A metal which is ductile in tension at room temperature can become brittle in the presence of notches *
   d. A metal which is ductile in tension at room temperature can become brittle under gradual rate of loading
   e. None of the above.

713. If the stress-strain curve for material is as shown in Fig.1 the material is said to be
   a. Perfect elastic material
   b. Perfect plastic material
   c. Ideal plastic material with elastic region
   d. Strain-hardening material *
   e. Rigid material.

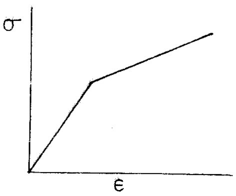
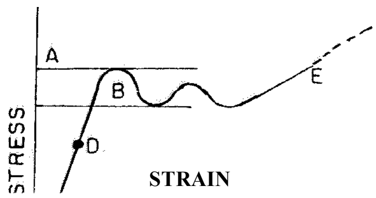


Fig.1

714. Point A, B, C, D and E are marked on the curve shown in Fig. Which is lower yield point
   a. A   b. B *
   c. C   d. D
   e. E.

715. In above case which is higher yield point
   a. A *   b. B
   c. C   d. D
   e. E



716. The defect responsible for the phenomenon of slip, by which ,most metals deform plastically, is known as
a. Fracture b. Twinning
c. Dislocation * d. Strain hardening
e. None of the above

717. Fatigue failure occurs when a part is subjected to
a. Tensile stress b. Compressive stress
c. Torsion d. Fluctuating stress *
e. None of above.

718. Stress concentration occurs when
a. A body is subjected to excessive stress
b. A body is subjected to unidirectional stress
c. A body is subjected to reversing stress
d A body is subjected to fluctuating stress
e. A body is subjected to non-uniform stress distribution *

719. Stress concentration may be caused by
a. Change in cross-sectional area
b. Change in shape
c. Change in dimensions
d. Polishing or painting a surface
e. A hole or a notch in the body.*

720. The amount of energy expended by the action of external force in deforming an elastic body is known as
a. Elastic energy b. Deformation energy
c. Work done d. Potential energy
e. Strain energy.*

721. If a body has identical properties all over it is known as
a. Homogeneous * b. Isentropic
c. Ductile d. Elastic
e. Plastic.

722. Some engineering materials are made up of more than one phase, with different mechanical properties, such materials are known as
a. Discontinuous b. Brittle
c. Plastic d. Heterogeneous *
e. None of the above.

723. When the metals are severely deformed in a particular direction, as in rolling or forging (on a macro scale), the mechanical properties may be
a. Identical b. Isotropic
c. Anisotropic * d. Uniform
e. Non-uniform.

724. If a material recovers its original dimensions, when the load is removed, it is known as
a. Brittle b. Elastic *
c. Plastic d. Annealed
e. Soft *

725. If the stress strain curve for a material is as shown in Fig. 3, the material is said to be
a. Elastic material b. Plastic material
c. Rigid ideal plastic
d. Strain hardening materials
e. Ideal plastic material with elastic region *

726. The behaviour of metals in which strength of a metal is increased and the ductility is decreased on heating at a relatively low temperature after cold working, is known as
a. Clustering
b. Solid solution hardening
c. Twinning
d. Screw dislocation
e. Strain aging *

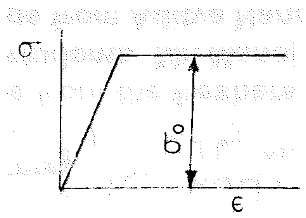


Fig. 3

727. Plastic deformation which is carried out in a temperature region and over a time interval such that the strain hardening is not relieved is known as
a. Hot work b. Cold work *
c. Annealing d. Bauschinger effect
e. None of the above.

728. Most of the energy expended in deforming a metal by cold working is
a. Utilised in overcoming deformation stresses
b. Utilised in deforming the metal
c. Converted into heat *
d. Consumed in developing internal stresses
e. None of the above.

729. Identify the incorrect statement, if any
a. A dislocation is the linear lattice defect that is responsible for nearly all aspects of the plastic deformation of metals
b. The dislocation structure of a crystal can be detected by X-ray deflection micro radiographic techniques
c. The strain field at the dislocation results in a different intensity
d. Dislocations in real crystals are rarely lie in a single plane
e. Dislocations in real crystals are generally straight lines which are generally in same plane.*

730. A ductile fracture is characterized by
a. Rapid rate for crack propagation
b. Negligible deformation
c. Fragmentation into more than two pieces
d. Appreciable plastic deformation prior to propagation of crack *
e. None of the above.

731. The tendency for brittle fracture increases with
   a. Increasing temperature
   b. Decreasing strain rate
   c. Appreciable plastic deformation before fracture
   d. Appreciable plastic deformation during propagation of the crack
   e. None of the above.*

732. In general, high cohesive forces are related to
   a. Large values of elastic constants *
   b. Low melting point
   c. Large coefficients of thermal expansion
   d. Small value of elastic constants
   e. None of the above.

733. The ability of a material to absorb energy when deformed elastically and to return it when unloaded is called
   a. Hardness
   b. Fatigue strength
   c. Creep
   d. Toughness
   e. Resilience *

734. For applied load P kg, diameter of ball D mm, and diameter of indentation d mm, the Brinell Hardness number is given by

   a. $$B_{HN} = \frac{P}{\frac{\pi}{2}\left(D - \sqrt{D^2 - d^2}\right)}$$

   b. $$B_{HN} = \frac{D}{\frac{\pi}{2}\left(D - \sqrt{D^2 - d^2}\right)}$$

   c. $$B_{HN} = \frac{P.D}{\frac{1}{2}\left(D - \sqrt{D^2 - d^2}\right)}$$

   d. $$B_{HN} = \frac{P.d}{\frac{1}{2}\left(d - \sqrt{D^2 - d^2}\right)}$$

   e. $$B_{HN} = \frac{P}{\left(\frac{\pi D}{2}\right)\left(D - \sqrt{D^2 - d^2}\right)}.\ *$$

735. The ability of a material to absorb energy in the plastic range is known as
   a. Hardness
   b. Fatigue strength
   c. Creep
   d. Toughness *
   e. Resilience.

736. Identify the incorrect statement
   a. The greatest error in Brinell hardness measurements occur in measuring the diameter of specimen
   b. Harder the material, greater the elastic recovery after deformation
   c. Owing to elastic recovery, the radius of curvature of the indentation will be larger than that of the spherical indentor
   d. In Brinell hardness test for soft materials low load is applied
   e. None of the above *

737. Identify the incorrect statement
   a. Fatigue strength is seriously reduced by the introduction of a stress raiser such as a notch or hole
   b. A fatigue failure is particularly insidous, because it occurs without any warning
   c. Fatigue results in a brittle fracture with no gross deformation at the fracture
   d. As the roughness of surface increases the fatigue life of specimen increases *
   e. None of the above.

738. A surface damage which results when two surfaces in contact experience light periodic relative motion is
   a. Fretting * b. Pitting
   c. Corrosion d. Surface wear
   e. None of the above.

739. The fatigue strength of materials increases
   a. With temperature
   b. By having scratch on the surface
   c. By having notches in specimen
   d. By under stressing the specimen *
   e. By over stressing the specimen.

740. Hardness may be defined as resistance to
   a. Local penetration b. Machining
   c. Wear d. Scratching
   e. Any of the above *

741. Toughness of a material means
   a. Strength * b. Fatigue resistance
   c. Stress relieving d. Machinability
   e. Softening.

742. The process of reheating hardened steel to temperature below the lower critical temperature followed by any desired rate of cooling, is known as
   a. Hardening b. Spheroidizing
   c. Tempering * d. Annealing
   e. Normalizing.

743. The process of production of articles having a soft ductile interior and a very hard surface, is known as
   a. Hardening
   b. Hardening and tempering
   c. Case hardening *
   d. Hardening and annealing
   e. None of the above.

744. Hardness of martensite is about
a. RC 65 * b. RC48
c. RC57 d. RC67
e. RC89.

745. Limestone is added in blast furnace to flux
a. Silicon oxide * b. Carbon
c. MnO_2 d. Sulphur
e. None of the above.

746. The purpose of annealing is to
a. Induce hardness
b. Induce stresses
c. Harden the surface
d. Produce irregular microstructure
e. Remove stresses *

747. Case hardening
a. Is done to induce hardness in the core of materials
b. Is followed by tempering
c. Is preceded by tempering
d. Is allowed by carburizing
e. Is done to get a soft ductile interior with a very hard surface.*

748. Any process of heating and cooling steel that produces a rounded or globular form of carbide is known as
a. Normalizing b. Ultra hardening
c. Drawing c. Nitriding
e. Spheroidizing *

749. Nitriding is a process for
a. Annealing b. Spheroidizing
c. Case Hardening * d. Normalizing
e. None of the above.

750. Malleability of a material is defined as
a. Ability to withstand compressive stresses
b. Ability to withstand deformation under shear
c. Ability to undergo large permanent deformation in compression *
d. The property by which a material can be cold worked
e. None of the above.

751. The effect of rolling on steel is
a. To elongate the inclusion in the direction of rolling giving the steel excellent properties *
b. Reduction in tensile strength
c. Reduction in fatigue strength
d. Reduction in hardness
e. None of the above.

752. Cold work is done on the metal
a. Below the thermal critical range *
b. Above the thermal critical range
c. At zero degree centigrade temperature
d. After slightly warming the metal in furnace
e. None of the above.

753. The process of heating iron base alloys to approximately 40°C above the critical temperature range followed by cooling to below that range in still air at ordinary temperature is known as
a. Normalizing * b. Annealing
c. Tempering d. Spheroidizing
e. Hardening

754. Ductility of a material may be defined as
a. Ability to undergo large permanent deformations in tension *
b. Capacity to withstand reversal of stresses
c. Ability to undergo temporary deformation in tension
d. Capacity to withstand combined tensile and shear forces
e. Capacity to resist deformation under pressure.

755. In Brinell hardness tests if a soft ball is used for indentation
a. The indentation will not be circular
b. It will not be possible to correctly measure the depth of indentation
c. The surface of indentation will be rough
d. The ball may deform *
e. None of the above.

756. In order to measure/detect materials by non-destructive testing the method generally used is
a. Acoustic emission *
b. Infrared radiometer
c. Liquid crystallography
d. Thermochemic point
e. Mossbauser effect.

757. Pig iron is
a. The product of the blast furnace and is made by the reduction of iron ore *
b. An open hearth iron very low in carbon, manganese and impurities
c. An alloy in which carbon percentage is low
d. An alloy containing carbon in free from
e. None of the above.

758. The dominant alloys in shock resisting tools steels are
a. Chromium tungsten * b. Carbon
c. Cobalt d. Nickel
e. Aluminium.

759. Ball bearings are generally made of
a. Cast iron b. Malleable cast iron
c. Carbon steel d. Stainless steel
e. Carbon chrome steel *

760. For cold work tool steels should have
a. Low wear resistance
b. High wear resistance *
c. Toughness
d. Poor hardenability
e. None of the above.

761. Shock resisting steels should have
   a. Low wear resistance
   b. High wear resistance
   c. Toughness *
   d. Poor hardenability e. None of the above.

762. High speed steels should have
   a. Toughness b. Wear resistance
   c. Hardenability d. (a) and (c) above
   e. (b) and (c) above *

763. 18-4-1 High speed steel contains
   a. 4% carbon b. 1% Carbon
   c. 4% Chromium d. 0.7 Carbon *
   e. 1% Cobalt.

764. Spring steel sections are originally applied in
   a. Hardened condition
   b. Hardened and tempered condition
   c. Annealed condition *
   d. Carburized condition
   e. None of the above.

765. The main alloy for corrosion resistance in stainless steel is
   a. Carbon b. Manganese
   c. Chromium * d. Cobalt
   e. Vanadium.

766. Silicon steel is widely used in
   a. Electrical industry *
   b. Chemical industry
   c. For making leaf springs
   d. For nuts and bolts
   e. For cutting tools.

767. The process by which steel is coated by a thin layer of phosphate is known as
   a. Anodising b. Parkerising *
   c. Spheroidizing d. Phosphorizing
   e. Sheradising.

768. Cast iron contains
   a. 0.2 to 0.4% carbon b. 0.4 to 0.7% carbon
   c. 1 to 1.3 % carbon d. 2 to 4% carbon *
   e. None of the above.

769. Chilled iron castings
   a. Are soft on surface
   b. Are freely machined
   c. Contain low carbon percentage
   d. Are highly resistant to wear *
   e. None of the above

770. The properties of cast iron are regulated by
   a. The composition of raw material
   b. Heating temperature
   c. Heat treatment
   d. Percentage of carbon present
   e. Control of amount, type, size and distribution of various carbon formations.*

771. The constituent which has a powerful softening effect on cast iron and its presence in cast iron reduces the ability of the iron to retain carbon in chemical combination, is
   a. Silicon * b. Aluminium
   c. Carbon d. Sulphur
   e. Chromium

772. Tensile strength of common varieties of cast iron is in the range
   a. 40-50 M Pa b. 50-80 M Pa
   c. 140-500 M Pa * d. 500-650 M Pa
   e. 650-1000 M Pa.

773. The elastic limit of cast iron is
   a. Low b. High
   c. Same as that of mild steel
   d. Low compression strength
   e. Close to ultimate breaking strength *.

774. Grey iron
   a. Has low ductility *
   b. Breaks with appreciable distortion
   c. Has brittleness
   d. Low compression strength
   e. None of the above.

775. In cast irons
   a. Impact strength is high
   b. With static loading the strength in tension is higher than that in compression
   c. With static loading the strength in tension is lower than that in compression *
   d. (a) and (b) above
   e. (a) and (c) above.

776. Chilling, heat treatment and alloy addition to cast iron generally
   a. Reduces machinability *
   b. Improves machinability
   c. Reduces wear resistance
   d. Reduces carbon percentage
   e. None of the above.

777. Cast irons are generally specified by
   a. Carbon percentage b. Iron percentage
   c. Hardness d. Process of manufacture
   e. Tensile strength *

778. In Carbon steel castings
   a. The percentage of carbon is less than 1.7% *
   b. The Percentage of carbon is between 1.7% to 2%
   c. The Percentage for alloying elements is controlled
   d. (a) and (c) above
   e. (b) and (c) above.

779. Steel castings
   a. Are weldable *
   b. Are not weldable
   c. Have poor endurance properties
   d. Can withstand impact
   e. Cannot withstand impact.

780. High ratio of surface to mass tend to
a. Produce smaller depths of hardening
b. Produce greater depth of hardening *
c. Produce only chilled surfaces
d. Produce non-uniformity in hardness on surface
e. Produce surface defects.

781. Moh's scale of hardness has the range
a. 1-3 b. 1-5
c. 5-10 d. 1-10 *
e. 10-15.

782. Iron alloyed with carbon more than 2% is called
a. Cast iron * b. Mild steel
c. Carbon steel d. High carbon steel
e. Alloy steel.

783. German silver contains
a. No silver b. 0.1% silver
c. 1% silver d. 5% silver *
e. 10% silver.

784. Aluminium alloys for pressure die casting
a. Must possess considerable fluidity *
b. Must not be free from hot shortness
c. Must have iron as one of the constituents
d. Must be light
e. None of the above.

785. Corrosion is a destructive attack on metals
a. Which may be chemical or electrochemical in nature *
b. Which is basically caused by atmospheric air
c. Which is caused by contact with other metals
d. At high temperature
e. None of the above.

786. The process of producing parts by electrolytic deposition of metal upon a conductive removable mould or matrix is known as
a. Deposition b. Plating
c. Electrolysis d. Electro-moulding
e. Electro forming *

787. Electro-forming is particularly valuable for
a. Good conductors of electricity
b. Decorative items
c. Thin walled parts requiring a high order of accuracy and internal surface finish *
d. Non-ferrous components
e. Parts which cannot be machined .

788. In electro-forming the metal is supplied to the mould from
a. Solution
b. By liquids
c. Electrolytic solution in which bar of pure metal acts as an anode for the plating current *
d. Separately by coating with a point
e. None of the above.

789. Metal spinning
a. Is done at low speeds
b. Is done on unsymmetrical articles
c. Is done on symmetrical articles *
d. Does not require dies
e. Utilises point hard tools.

790. Which one is different from the others in press work
a. Embossing b. Bulging
c. Cupping d. Tube forming
e. Notching *

791. The percentage of carbon in low carbon steel is
a. 0.15 * b. 0.5
c. 0.7 d. 1.0
e. 1.3

792. The presence of sulphur in pig iron makes
a. It hard b. It brittle
c. It malleable d. It machinable
e. Its casting unsound *

793. The technique of converting metallic powders into articles of definite form is known as
a. High pressure pressing
b. Carbiding
c. Powder metallurgy *
d. Plasticizing
e. None of the above.

794. In powder metallurgy the process of heating the cold pressed metal powder is known as
a. Sintering * b. Granulation
c. Deposition d. Precipitation
e. None of the above.

795. The process of shaping thin metals by pressing it against form while it is rotating is known as
a. Pressing b. Bending
c. Trimming d. Extruding
e. Metal Spinning *

796. Which one is different from the others in press work operations ?
a. Coining b. Sizing
c. Flattening d. Riveting
e. Punching *

797. In press work the dies that perform two or more operations simultaneously, but at different stations are known as
a. Simple dies b. Compound dies
c. Progressive dies * d. Die and Punch set
e. Multi-dies.

798. Which one is different from the remaining
a. Cyniding b. Nitriding
c. Flame hardening d. Electroplating *
e. Pack carburizing.

799. Which process is different from the others
 a. Short peening b. Sand blasting
 c. Cold extruding d. Cold heading
 e. Drop forging *

800. The process of pulling a rod through series of decreasing diameters is known as
 a. Staking b. Stretch forming
 c. Metal spinning d. Trimming
 e. Wire drawing *

801. Dies for drawing are generally made of
 a. Cast iron b. Mild steel
 c. High carbon steel d. Stainless steel
 e. Carbides *

802. Which one is different from the other in press work?
 a. Blanking b. Punching
 c. Perforating d. Slitting
 e. Seaming *

803. The operation of cutting out flat areas to some desired shape and which is generally the first step in a series of operations is known as
 a. Coining b. Curling
 c. Blanking * d. Slitting
 e. Lancing.

804. In press work the dies which combine two or more operations at one station are known as
 a. Simple dies b. Press
 c. Compound dies * d. Progressive dies
 e. Die and punch.

805. When metal is deformed by cold work, severe stresses known as residual stresses are undesirable and to remove them
 a. The metal should be stressed in reverse direction
 b. The metal should be painted
 c. The metal should be reheated below recrystallization temperature *
 d. The metal should be reheated above recrystallization temperature
 e. None of the above.

806. Shot peening
 a. Improves fatigue life of small parts *
 b. Causes metal surface to be in tension and the layer beneath in compression
 c. Changes the crystalline structure of material
 d. Refines the grain structure
 e. Is done at recrystallization temperature.

807. In cold working of metals
 a. Close dimensional tolerance cannot be maintained
 b. Poor surface finish is obtained
 c. Recrystallization temperature for steel is reduced
 d. Grain structure remains unchanged
 e. Strength and hardness of steel is increased.*

808. The surface hardness that can be obtained by nitriding is generally in the range
 a. 1000 to 1100 VPN * b. 800 to 1000 VPN
 c. 600 to 800 VPN d. 400 to 600 VPN
 e. Below 400 VPN.

809. Spot the process which is different from others ?
 a. Carburizing b. Nitriding
 c. Cyaniding d Chapmanizing
 e. Galvanizing.*

810. Spot the process which is different from others ?
 a. Hot rolling b. Forging
 c. Cold heading * d. Drop forging
 e. Swaging.

811. Identify the incorrect statement
 a. When material is cold worked the resulting change in material shape brings about marked changes in the grain structure
 b. Structural changes in cold working are grain fragmentation and lattice distortion
 c. Much greater pressures are needed for hot working than for cold working *
 d. Hot working performed on the metals is in a plastic state
 e. Residual stresses are set up in cold working.

812. The amount of cold work that a metal will stand is dependent upon
 a. Room temperature b. Carbon percentage
 c. Process d. Purity of metal
 e. Ductility.*

813. The advantage of electroforming is
 a. Extreme dimensional accuracy can be held on surfaces with surface finish of 8 r.m.s. or even less
 b. Laminated metals can be produced
 c. Rate of production is very high
 d. (a) and (b) above *
 e. (a) and (c) above.

814. The limitations of electroforming are
 a. Cost is high
 b. Production rate is generally very low
 c. Recesses can be easily formed
 d. (a) and (b) above *
 e. (a) and (c) above.

815. The process of zinc coating used extensively for protecting steel from atmospheric deterioration is known as
 a. Anodizing b. Colourizing
 c. Parkerizing d. Galvanizing *
 e. None of the above.

816. Process of making a thin phosphate coating on steel to act as a base or printer for enamels and paints is known as
 a. Prepainting b. Surface preparing
 c. Parkerizing * d. Anodising
 e. Colourizing.

817. Galvanizing is generally done on
a. Low carbon steels *
b. Cast irons
c. Non-ferrous metals
d. Non-metallic substances
e. None of the above.

818. In high speed steel the maximum percentage of any alloying element is
a. Carbon b. Tungsten *
c. Chromium d. Vanadium
e. Molybdenum.

819. In inverse rate curve
a. The abscissa is carbon percentage
b. The abscissa is temperature
c. The abscissa is time
d. The ordinate is time
e. The ordinate is temperature.*

820. Certain changes which take place at the critical points are called
a. Polytropic changes
b. Structural changes
c. Allotropic changes *
d. Critical point changes
e. None of the above.

821. The critical points for steels
a. Occur at same temperature for all steels
b. Change the chemical composition of steel
c. May change in number on heating or cooling
d. Cause change in physical properties *
e. Indicate the minimum temperature below which structural changes in steel are not possible.

822. A reversible change in an atomic structure of the metal with a corresponding change in the properties of steel is known as
a. Isentropic change
b. Polytropic change
c. Allotropic change *
d. Thermodynamic change
e. None of the above.

823. Steel cannot be hardened unless it is heated
a. Above the lowest critical point *
b. Above the middle critical point
c. Above the highest critical point
d. Between the first and second critical point
e. Between the second and third critical point.

824. When piece of 0.2% carbon steel is heated above third critical point the steel is a solid solution of carbon in gamma iron and called
a. Austenite * b. Pearlite
c. Cementite d. Eutectoid
e. Ferrite.

825. The solid solution carbon in alpha iron obtained on cooling of 0.2% carbon steel which have been heated above the third critical point is called
a. Ferrite * b. Pearlite
c. Austenite d. Ferrite
e. Cementite.

826. In a 0.2% carbon steel which has been heated above the third critical temperature on cooling at the first critical point the austenite remaining in solution is transformed to new structure called
a. Ferrite b. Pearlite *
c. Austenite d. Ferrite
e. Cementite.

827. Steel with 0.8% carbon and 100% pearlite is called
a. Eutectoid * b. Hyper-eutectoid
c. Austenite d. Solid’s
e. None of the above.

828. Coarse grained steels
a. Are very tough b. Are less tough *
c. Do not have tendency to distort
d. Are denser e. Are lighter

829. A steel having ferrite and pearite is
a. Soft * b. Hard
c. Ductile d. (a) and (b) above
e. (a) and (c) above.

830. The maximum hardenability of any steel depends on
a. The carbon content *
b. The chemical composition
c. The grain size
d. The alloying elements present
e. None of the above.

831. The essential gradient of any hardened steel is
a. Martensite * b. Austenite
c. Cementite d. Pearlite
e. Carbon.

832. Delta iron occurs at temperature in the range of
a. Room temperature to 600^{o}C
b. 600^{o}C to critical temperature
c. Between 800^{o}C and 1200^{o}C
d. Between 1400^{o}C and 1530^{o}C *
e. None of the above.

833. The ability of a tool to resist softening at high temperatures is known as
a. Super hardness b. Red hardness *
c. Extended hardness d. Double hardness
e. None of the above.

834. In 18-4-1 high speed steel the maximum percentage of any constituent is
a. Carbon b. Tungsten
c. Chromium d. Vanadium
e. Iron *

835. In iron-iron carbide diagram the
   a. Abscissa is time
   b. Abscissa is temperature
   c. Abscissa is carbon percentage *
   d. Ordinate is time
   e. None of the above.

836. Gamma iron exists at temperatures in the range
   a. Room temperature and lower critical temperature
   b. Between 500°C and 850°C
   c. Between 900°C and 1400°C *
   d. Between 1400°C and 1600°C
   e. Above 1600°C

837. Solder is an alloy consisting of
   a. Tin, antimony and copper
   b. Tin and copper
   c. Tin and lead *
   d. Lead and copper
   e. Copper and aluminium.

838. German silver is an alloy of
   a. Nickel, copper and zinc *
   b. Silver, Copper and nickel
   c. Silver, Copper and lead
   d. Silver, gold and platinum
   e. Silver, with impurities below 1%.

839. The fine grained steel
   a. Are brittle
   b. Are lighter
   c. Are ductile *
   d. Have more tendency to distort
   e. None of the above.

840. The Primary purpose of annealing is to
   a. Restrict the hardness of steel
   b. Soften the steel for machining after cold working *
   c. Reduce carbon percentage
   d. Change the crystalline structure
   e. None of the above

841. Carburizing is done
   a. On steel with carbon percentage of 0.7%
   b. On steels with carbon percentage of 0.5% *
   c. To improve hardenability of steel
   d. By heating 200°C below critical temperature
   e. To induce soft surface for machining on a hard core.

842. Recrystallisation temperature is one
   a. At which crystals again begin to appear
   b. At which new spherical crystals first begin to form from the old deformed ones when a strained metal is heated *
   c. At which crystals start growing in size
   d. At which polycrystalline changes occur
   e. At which change of allotropic form takes place.

843. Monel metal consists of
   a. Nickel, lead and tin
   b. Zinc, copper and lead
   c. Zinc, nickel and copper
   d. Aluminium, Copper and nickel
   e. Nickel and copper.*

844. Identify the statement which is incorrect
   a. The primary purpose of annealing is to soften the hard steel
   b. Annealed steel can be easily machined or cold worked
   c. Annealing is usually accomplished by heating the steel to slightly above the critical temperature, holding it there till the temperature is uniform and then cooling at a slow rate
   d. Annealing induces internal stresses *
   e. All of the above.

845. In compression, a prism of brittle material will break
   a. Into large number of pieces
   b. By forming a bulge
   c. By Shearing along oblique plane *
   d. In a direction along the direction of load
   e. None of the above.

846. Hastalloy consists of
   a. Nickel and copper
   b. Copper and aluminium
   c. Aluminium and nickel
   d. Nickel and molybdenum *
   e. Nickel, copper and aluminium.

847. Which is amorphous material out of the following ?
   a. Zinc   b. Lead
   c. Silver   d. Brass
   e. Glass.*

848. Hard steels and non-ferrous metal do not exhibit a definite yield point when pulled in the testing machine and for such cases a better measure of their elastic properties is defined by
   a. Yield point stress   b. Yield point strain
   c. Proof stress *   d. Ultimate stress
   e. None of the above.

849. Brinell hardness number for nitrided steel is in the range
   a. 60 to 80   b. 100 to 150
   c. 200 to 300   d. 300 to 450
   e. 700 to 800.*

850. The furnace used for castings of cast iron in a foundry shop is known as
   a. Blast furnace
   b. Reverberatory furnace
   c. Electric induction furnace
   d. Cupola *
   e. Muffle furnace.

851. The machine used for determining tensile strength of steel is
a. Hydraulic jack
b. Hydraulic press
c. Mechanical Press
d. Universal testing machine *
e. None of the above.

In Qs. 852 to 857 select the treatment used out of the following :
a. Solution annealing b. Normalising
c. Stress relieving d. Artificial aging
e. Tempering

852. For steel balls after cold heading(b)

853. For treatment of castings.(b)

854. For post weld heat treatment.(c)

855. For softing hardened materials.(e)

856. For heat treatment of cold formed parts.(a)

857. For heat treatment of stainless steels.(d)

858. Pipes for bicycle frames are made of
a. Hot rolled steel b. Cold rolled steel *
c. Cast iron d. Stainless steel
e. Carbon chrome steel.

859. In drop forging the forging is done by
a. Dropping the workpiece at high velocity
b. Dropping the hammer at high velocity
c. Dropping the die with hammer at high velocity *
d. Dropping a weight on hammer to produce requisite impact
e. None of the above.

860. Trimming is a process associated with
a. Forging * b. Electro plating
c. Press work d. Machining of metals.
e. Polishing of metals.

861. Steel pipe are generally manufactured by
a. Machining process
b. Forging process
c. Extrusion process *
d. Cold working process
e. Electroforming process.

862. The process by which a steel ingot is converted into a sheet is known as
a. Machining Process b. Forging Process
c. Routing Process d. Rolling Process *
e. Re-rolling Process

863. Sheradising process is used for
a. Heat treatment of steels
b. Heat treatment of high speed steels
c. Machining metals
d. Cold working on metals
e. Surface coating.*

864. Hot tear
a. Is a physical property of non-ferrous materials
b. Is a process involving heating
c. Is a phenomenon occurring in materials exposed to weather e.g. sun and rain
d. Is a defect in wood
e. Is a defect in castings.*

865. Cold shuts are
a. Saturation of pores in bricks
b. Saturation of pores in metals by subsituting materials different from parent materials
c. Defects in castings due to two streams of metal which are too cold to fuse properly *
d. Forging defects due to improper heating of materials
e. None of the above.

866. The defect blow hole in castings is caused due to
a. Hard ramming
b. Excessive moisture
c. Improper venting
d. Excessive carbonacious material
e. Any of the above.*

867. The raw material for mini steel plants is
a. Iron ore
b. Pig iron
c. Grey iron
d. CI and steel scrap *
e. None of the above.

868. Coal used in a cupola is
a. Charcoal b. Pulverized coal
c. Graphite d. Coke *
e. Coking coal.

869. During induction hardening the depth of hardening is controlled by
a. Current b. Voltage *
c. Frequency d. Phase angle
e. None of the above.

870. Which process is used for machining parts to planned dimensions ?
a. Routing * b. Shearadising
c. Electroforming d. Swaging
e. Anodizing.

871. Which process is used for joining parts or materials?
a. Tumbling b. Parkerizing
c. Swaging d. Extruding
e. Sintering.*

872. Cheek is
   a. Top surface of metal
   b. Physical property of metal
   c. Core of the welded joints in case of very thick material
   d. Non-ferrous coating on materials
   e. Intermediate flask between copes and drag.*

873. The phenomenon of weld decay is found in
   a. Cast iron b. Brass
   c. Bronze d. Gun metal
   e. Stainless steel.*

874. In pack-carburising carbon is supplied
   a. Through gas
   b. In the form of graphite
   c. In the form of charcoal *
   d. In the form of hydrocarbons
   e. In the form of calcium carbide.

875. Age hardening is generally applicable to
   a. Cast iron
   b. Medium carbon steels
   c. High alloy steels
   d. Alloys of aluminium, magnesium, nickel etc.*
   e. Alloys of chromium, vanadium etc.

876. In induction hardening
   a. The voltage is high
   b. The current is high
   c. The frequency is high *
   d. The power factor is high
   e. Only d.c. supply is used.

877. In flame hardening the flame used is
   a. A wick stove b. Oil burner
   c. Gas burner d. Oxy-acetylene *
   e. Oxygene air.

878. Which process is used primarily to obtain surface finish
   a. Parkerizing * b. Shining
   c. Broaching d. Electroforming
   e. Swaging.

879. Age hardening is related with
   a. Stainless steel * b. Gun metal
   c. Duralumin d. Cast iron
   e. German silver.

880. The process of austempering results in the formation of
   a. Carburized structure b. Nitride structure
   c. Martensitic structure d. Bainite structure *
   e. Superhand structure.

881. If steel is slowly cooled in furnace, the structure obtained is
   a. Pearlite * b. Sorbite
   c. Troosite d. Acicular
   e. Martensite.

882. If steel is quenched in water, the structure obtained is
   a. Pearlite b. Sorbite
   c. Troosite d. Acicular
   e. Martensite.*

883. If steel is quenched in oil, the structure obtained is
   a. Pearlite b. Sorbite
   c. Troosite * d. Acicular
   e. Martensite.

884. If steel is cooled in still air, the structure obtained is
   a. Pearlite b. Sorbite *
   c. Troosite d. Acicular
   e. Martensite.

885. In case of eutectoid steels which one of the following structures has the maximum hardness ?
   a. Pearlite b. Sorbite
   c. Troosite d. Acicular
   e. Martensite.*

886. One of the objects of annealing is
   a. To soften the metal
   b. To improve machinability
   c. To refine grain structure
   d. To refine internal stresses
   e. All above.*

887. In normalising steel is heated 40-50^o C
   a. Above room temperature
   b. Above the upper transformation range *
   c. Above the lower transformation range
   d. Below the upper transformation range
   e. Below the lower transformation range.

888. The process in which steel is heated 20 to 40^{o}C below the lower critical temperature, held there for a prolonged period and then allowed to cool slowly in the furnace is known as
   a. Normalising b. Annealing
   c. Spheroidising * d. Tempering
   e. Austempering.

889. The process of reheating the hardened steel to some temperature below the critical range, followed by any rate of cooling is known as
   a. Tempering * b. Annealing
   c. Austempering d. Normalising
   e. Spheroidising.

890. The process in which steel is heated in a molten salt bath having temperature 250 to 500^{o}C above the critical temperature, then quenched at a sufficient rate into a molten bath between 200 to 450^{o}C held there for sufficient period and then cooled to room temperature is known as
   a. Tempering * b. Dual tempering
   c. Hardening and tempering
   d. Austempering
   e. Martempering.

891. Crystal structure of a material is generally examined by
a. Naked eye
b. Microscope
c. Optical microscope
d. X-rays and electron diffraction *
e. Spectroscope techniques.

892. Ferromagnetic alpha iron change to paramagnetic alpha iron at
a. 1650°C
b. 1500°C
c. 1400°C
d. 910°C
e. 77°C *

893. Which one of the following is usually most ductile?
a. Hexagonal close packed lattice
b. Body centred cubic lattice
c. Face centred cubic lattice *
d. Combination of (A) and (C) above
e. None of the above.

894. The blast furnace uses the following as fuel :
a. Coal
b. Coke *
c. Blast furnace gas
d. Producer gas
e. Cooking coal.

895. For better fluidity of the molten metal, the following is added in blast furnace
a. Line
b. Sulphur
c. Carbon
d. Oil
e. Manganese.*

896. The product of blast furnace is known as
a. Cast iron
b. Steel *
c. High carbon steel
d. Pig iron
e. Crude iron.

897. Micro-structure of a material is generally examined by
a. Naked eye
b. Microscope *
c. Optical microscope
d. X-ray and electron diffraction
e. Spectroscope techniques.

898. A bearing alloy should have
a. Capacity to withstand shocks and vibrations
b. Low coefficient of friction
c. High compressive strength
d. High resistance to corrosion
e. All the above.*

899. A lead based bearing alloy contains
a. Lead - antimony - tin - copper *
b. Lead - antimony - tin - silver
c. Lead - nickel - tin
d. Lead - copper - nickel - tin
e. Lead - aluminium - copper.

900. Constantan is an alloy of
a. Nickel - iron - chromium
b. Copper and nickel *
c. Copper - aluminium
d. Copper - tin
e. Copper - tin - zinc.

901. Muntz metal contains
a. Copper - nickel
b. Copper - zinc *
c. Copper - tin
d. Copper - aluminium
e. Copper - chromium.

902. Carbon steel is
a. An alloy of carbon and iron with varying quantities of phosphorous *
b. An alloy of carbon and iron obtained by oxidising excessive carbon from cast iron
c. An alloy of carbon and iron obtained by oxidising excessive carbon steel
d. An alloy of carbon generally obtained by adding graphite to low carbon steels
e. None of the above.

903. "Troosite" is obtained when
a. Quenching steel during transformation *
b. A fully hardened steel is finally drawn at about 677°C
c. Steel is rapidly quenched in oil
d. When alloy steels are rapidly quenched in water
e. None of the above.

904. In order to improve machinability of steels, the treatment generally done is
a. Annealing *
b. Tempering
c. Normalising
d. Spheroidising
e. Cyniding.

905. Cyaniding is the process of
a. Adding carbon steel
b. Adding carbon and nitrogen to increase hardness of core
c. Adding carbon and nitrogen to increase hardness of specimen uniformly
d. Adding carbon and nitrogen to increase hardness at the surface *
e. Creating a layer on the surface to impart the property of wear resistance.

906. Electronic structure of a material is generally studied by
a. Naked eye
b. Microscope
c. X-ray and electron diffraction
d. Spectroscope techniques *
e. Mossbauer studies.

907. The product of a cupola known as
a. Pig iron
b. Cast steel
c. Steel
d. Cast iron *
e. Malleable iron.

908. Blast furnace gas is
a. A flue gas discharged to atmosphere
b. Highly poisonous
c. Used as fuel in a blast furnace
d. A by-product of blast furnace *
e. Used as a cooking gas.

909. Wrought iron is
   a. Soft b. Hard
   c. Least resistant to corrosion
   d. Highly resistant to corrosion *
   e. Heat treated to change its properties.

910. The depth hardness of steel increases by the addition of
   a. Manganese b. Sulphur
   c. Silicon d. Chromium *
   e. Nickel.

911. Inconel is an alloy containing
   a. Copper, nickel and cobalt
   b. Nickel, chromium and iron
   c. Nickel, copper and iron
   d. Nickel, zinc and iron *
   e. Copper nickel and chromium

912. 'Sorbite' is obtained when
   a. Quenching steel during transformation
   b. Steel is annealed *
   c. A fully hardened steel is finally 'drawn' at about 677°C
   d. None of the above.

913. Bush bearings is
   a. Phosphor bronze b. Aluminium bronze
   c. Mild steel d. White metal alloy *
   e. None of the above.

914. A Babbitt is
   a. A eutectic of iron and iron phosphide *
   b. A gadget for measuring volume
   c. Antimony bearing lead or tin alloy
   d. A measure of magnetic induction produced in a material
   e. None of these.

915. Lime stone acts as a flux in a cupola. It is generally added in the proportion
   a. 10 kg of limestone per tonne of iron
   b. 30 kg of limestone per tonne of iron
   c. 100 kg of limestone per tonne of iron *
   d. 500 kg of limestone per tonne of coke
   e. One tonne of limestone per tonne of charge.

916. A bot in cupola is
   a. A flux
   b. A part of coupla *
   c. A king of cast iron
   d. A clay plug to close tap hole
   e. A defect in casting.

917. Steel balls for ball bearings are generally made of
   a. Stainless steel
   b. Free carbon steel
   c. Carbon chrome steel *
   c. Nodular cast iron
   e. Cast steel.

918. The hardness of steel depends on
   a. Heating temperature before quenching
   b. Amount of carbon it contains
   c. The shape and distribution of carbides in iron *
   d. Percentage of alloying elements
   e. Basic process from which it is produced.

919. The cast iron has
   a. High ductility
   b. High malleability
   c. High tensile strength *
   d. Elastic limit close to ultimate breaking strength
   e. None of the above.

920. Machining properties of steel are improved by adding
   a. Chromium b. Nickel
   c. Cobalt d. Lead *
   e. Silicon.

921. Induction hardening is the process of
   a. Hardening the core
   b. Uniform hardening
   c. Selective hardening
   d. Hardening surface for wear resistance *
   e. Electrical hardening process.

922. Corrosion resistance of steels is increased by the addition of alloying elements like
   a. Sulphur
   b. Silicon and sulphur
   c. Chromium and nickel
   d. Cobalt and vanadium *
   e. Tungsten.

923. Cemented carbide tools are generally not used for the machining of
   a. Steel b. Aluminium
   c. Brass * d. Bronze
   e. Cast iron.

924. If a solid cube is subjected to equal tensile stresses on all its faces the volumetric strain is n times the linear strain, where
   a. $n = 1$ b. $n = 2$
   c. $n = 3$ d. $n = 6$
   e. $n = 9$.*

925. Blisters in wrought iron cause
   a. Brittleness at high temperatures
   b. Brittleness at low temperatures
   c. Loose textured metal *
   d. Voids created due to chemical reaction between carbon and iron oxide
   e. None of the above.

926. Cold shortness is
   a. Too much shrinkage of materials at low temperatures
   b. Uneven shrinkage of material at low temperatures
   c. Brittleness of material at low temperature
   d. The region where Hooke's law does not hold good*
   e. None of above.

927. A material is known as allotropic or polymorphic if it
   a. Has its atoms distributed in random pattern
   b. Exists in several crystal forms at different temperatures
   c. Has a fixed structure under all conditions *
   d. Responds to heat treatment
   e. Can be cast.

928. Permalloy is
   a. A non-ferrous alloy used in aircraft industry
   b. A non-ferrous alloy containing nickel copper and chromium *
   c. An nickel and iron alloy having high permeability
   d. A kind of stainless steel
   e. An alloy similar to carbides.

929. Dielectric strength of a material is
   a. Capacity to take two stresses
   b. Magnetic property
   c. Capacity to withstand high voltage *
   d. Capacity to resist flow of current
   e. Energy storage capacity.

930. Nichrome are alloys of
   a. Nickel, chromium
   b. Nickel, chromium and copper
   c. Nickel, chromium and silver *
   d. Nickel, chromium and aluminium
   e. Nickel, chromium and iron.

931. Monel metal is
   a. Aluminium Copper alloy
   b. Aluminium Silver alloy
   c. Copper Nickel alloy
   d. Nickel-Chromium alloy
   e. Chromium-Molybdenum alloy.*

932. Wrought iron is
   a. Used for castings
   b. Not used for castings
   c. Easily hardened *
   d. Least resistant to corrosion fatigue stresses
   e. Melts easily at 1500°C.

933. Steel may be manufactured by
   a. Bessemer process b. Open hearth process *
   c. Cementation process d. Duplex process
   e. Any of the above.

934. A material which undergoes no deformation till its yield point is reached and then it flows at a constant stress is known as
   a. Elastic b. Plastic
   c. Rigid d. Elastic-plastic
   e. Rigid plastic *.

935. During stress relaxation phenomenon
   a. Deformation tends to bind the joint and produces a stress reduction
   b. Deformation tends to loosen the joint and produces a stress reduction
   c. Stress is no longer proportional to strain
   d. Stress reduces on increasing load
   e. None of the above.*

936. Diamagnetic materials are
   a. Only slightly magnetised
   b. Strongly magnetised *
   c. Magnetised with eddy currents only
   d. Magnetised in a direction opposite to that of the applied field
   e. None of the above.

937. Residual magnetism is
   a. Magnetism left in a sample after a decade
   b. Magnetism left in a sample after one year
   c. Flux density present in a material after magnetising force is removed *
   d. The magnetic force required to fully demagnetise a sample
   e. None of the above.

938. The loss of strength in compression which occurs when there is a gain in strength in the tension due to overloading is
   a. Iso-strain b. Relaxation
   c. Hysteresis * d. Boushinger effect
   e. Hooke's effect.

939. Spring steels should have high resistance to
   a. Shocks b. Fatigue
   c. Corrosion d. Deformation *
   e. All of the above.

940. Vanadium is added to steel as an alloying element to
   a. Increase temperature resistance
   b. Increase shock resistance
   c. Modify yield and tensile strength properties
   d. Increase resistance to corrosion
   e. To soften the material.*

941. Chromium when added as an alloying element to steels
   a. Softens the material
   b. Refines the grain structure
   c. Increases corrosion resistance *
   d. Increases red hardness
   e. Improves mechanical properties.

942. Pearlitic or eutectoid steels have carbon content
   a. 0.2% b. 0.7%
   c. 0.83 % * d. 1.7 %
   e. 2 %.

943. The behaviour of visco-elastic material is
   a. Time dependent b. Independent of time
   c. Elastic * d. Plastic
   e. Ductile.

944. Visco-elastic behaviour is common in
   a. Crystalline materials *
   b. Non-crystalline solids
   c. Non-crystalline organic polymers
   d. Plastics
   e. Rubber.

945. An elastic behaviour of materials is expressed in terms of
 a. Stress strain curve b. Relaxation time
 c. Adiabatic time * d. Isothermal time
 e. Hysteresis loop area.

946. The material which undergo recoverable deformation and exhibit rubber like elasticity are called
 a. Pure elastic materials
 b. Elastomers * c. Rubbers
 d. Creep-elastic e. None of the above.

947. The greatest amount of strain energy per unit volume that a material can absorb without exceeding its elastic limit is
 a. Elastic limit b. Toughness *
 c. Resilience d. Proof resilience
 e. Endurance limit.

948. Machinability of a metal depends on
 a. Tensile strength b. Hardness
 c. Toughness d. (a) and (b) above *
 e. (b) and (c) above.

949. The variable stress below which the probability of failure of a material is negligible, is called
 a. Elastic limit b. Plastic limit
 c. Yield point d. Endurance limit *
 e. Tolerance limit.

950. The modulus of elasticity E, the modulus of rigidity C, and Poisson's ratio are related by the equation
 a. $E = 2G(1+\mu)$ * b. $E = G(2+\mu)$
 c. $E = G(1+2\mu)$ d. $E = 2G(1-\mu)$
 e. $E = 2G(1-2\mu)$.

951. The modulus of elasticity E, the bulk modulus of elasticity K and the Poisson's ratio are related by the relation
 a. $E = K(1-\mu)$ b. $E = 2K(1+\mu)$
 c. $E = K(2+\mu)$ d. $E = 3K(1-2\mu)$ *
 e. $K = (1+\mu)$.

952. For a given material having Young's modulus of elasticity E, modulus of rigidity G, Bulk modulus K and Poissons ratio μ, the relation which does not hold good is known as
 a. $E = 3G\left(1 - \frac{E}{m}\right)$ b. $E = 2G(1+\mu)$
 c. $E = 3K(1-2\mu)$ d. $E = \frac{9KG}{3K+G}$ *
 e. $E = 2K.\left(1 - \frac{2}{\mu}\right)$.

953. Every material obeys the Hooke's law within
 a. Elastic limit * b. Plastic limit
 c. Breaking limit d. Yield limit
 e. Limit of proportionality.

954. When elastic limit is reached
 a. Tensile strain decreases in proportion to stress *
 b. Tensile strain increases in proportion to stress
 c. Tensile strain increases more quickly
 d. Tensile strain decreases more quickly
 e. None of the above.

955. Bainite is a fine mixture of
 a. ferrite and cementite *
 b. cementite and pearlite
 c. pearlite and ferrite
 d. austenite and ferrite.

956. If a material has similar properties throughout its volume, it is said to be
 a. Isotropic b. Isentropic
 c. Continuous d. Uniform
 e. Homogeneous.*

957. The property of a metal when the recovery after unloading is complete but not instantaneous is
 a. Elasticity b. Plasticity
 c. Inelasticity d. An elasticity *
 e. Visco elasticity.

958. The ability of material to absorb a large amount of energy is
 a. Ductility b. Malleability
 c. Toughness * d. Resilience
 e. Hardness.

959. The property by which a body returns to its original shape after the removal to the load is called
 a. Ductility b. Malleability
 c. Softness d. Elasticity *
 e. Plasticity.

960. The property of materials by which they can be drawn into wires is known as
 a. Ductility * b. Elasticity
 c. Plasticity d. Malleability
 e. Creep.

961. The property of material by which it can be rolled into sheets is called
 a. Plasticity b. Elasticity
 c. Malleability * d. Ductility
 e. Creep.

962. The phenomenon of materials in which slow extension of materials takes place with the time at constant load is known as
 a. Plasticity b. Elasticity
 c. Malleability d. Ductility
 e. Creep.*

963. The materials which has the same elastic properties in all directions is called
a. Brittle material
b. Homogeneous material
c. Hard material
d. Isotropic material *
e. Isentropic material.

964. Accoustical materials
a. Absorb sound * b. Reflect sound
c. Create sound

965. Porous materials generally
a. Absorb most of the sound *
b. Reflect entire sound
c. Transmit sound.

966. A concrete wall generally
a. Reflects sound * b. Absorbs sound
c. Transmits sound d. Creates sound.

967. Brinell hardness number of soft Brass is usually in the range
a. 10-50 b. 50-70 *
c. 80-150 d. 150-300
e. 300-450.

968. Brinell hardness number of mild steel should expected to be in the range be
a. 20-50 b. 50-110
c. 110-150 * d. 150-300
e. 300-450.

969. Steel balls for ball bearings are hardened to
a. 100 VPN b. 150-200 VPN
c. 200-400 VPN d. 400-700 VPN
e. 700-800 VPN.*

970. The theory of failure which gives fairly good results for the ductile materials is
a. Hooke's law
b. Maximum shear stress theory
c. Maximum Principal stress theory
d. Maximum strain energy theory
e. Maximum shear strain energy theory.*

971. The theory of failure generally applied in case of brittle materials is
a. Maximum shear stress theory
b. Maximum Principal stress theory *
c. Maximum strain energy theory
d. Maximum shear strain energy theory
e. Theory of superposition.

972. The number of elastic constants for a completely anisotropic elastic material which follows Hooke's law is
a. 2 b. 3
c. 4 d. 21 *
e. 25.

973. If Young's modulus of elasticity is determined for mild steel in tension and in compression, the two values E_t / E_e will have a ratio of
a. 1 * b. 0.5
c. 1.2 d. 2
e. $\frac{1}{2}$

974. In case of a biaxial stress system when a member is subjected to tensile stresses in two perpendicular directions the maximum shear stress in case of mild steel occurs on a plane inclined at
a. $22\frac{1}{2}^{\circ}$ b. 30°
c. 45° * d. 90°
e. 0°.

975. The process of polymerisation is associated with
a. Cast iron
b. High speed steel
c. Non-ferrous material
d. Non-metallic materials
e. Thermo-plastic.*

976. Boring is generally
a. Followed by reaming
b. Preceded by reaming
c. Followed by drilling
d. Preceded by drilling *
e. None of the above.

977. Coolant is used on a lathe
a. To cool the work piece
b. To cool the tool
c. To remove the chips
d. All the above *
e. None of the above.

978. Small end of a connecting rod forging is
a. Super-finished b. Lapped
c. Honned d. Ground
e. Broached.*

979. Preheating of material to be welded is necessary in case of
a. Carbon steel b. Stainless steel
c. High speed steel d. Cast iron *
e. Non-ferrous materials.

980. Heavy water is used in atomic power plants as
a. Fuel b. Source of energy
c. Lubricant d. Moderator *
e. Viscous damping fluid.

981. Electron with energy level of 2 MeV is considered as
a. Dead slow electron
b. Slow electron
c. Fast electron *
d. Super-fast electron
e. There is no consideration as such.

982. Which of the following is a fuel used in fast reactors?
    a. Chromium b. Plutonium *
    c. Heavy water d. Zirconium
    e. Graphite.

983. In Brinell hardness testing the time of loading is
    a. 15 seconds * b. 30 seconds
    c. 1 minute d. 5 minute
    e. 10 minutes.

984. Brinell and Vickers hardness tester can be used to determine the hardness of
    a. 10 b. 30
    c. 100 d. 300 *
    e. 600.

985. Which of the following hardness tester can be used to determine the hardness of a glass sheet ?
    a. Brinell hardness tester
    b. Vickers hardness tester
    c. Rockwell hardness tester
    d. Shore scleroscope *
    e. None of the above.

986. Notches in a section produce
    a. Compressive stress
    b. Shear stresses
    c. Biaxial tensile stresses
    d. Tri-axial tensile stresses *
    e. None of the above.

987. Creep is expressed in terms of
    a. kg/cm b. kg/cm^2
    c. cm/cm d. cm/cm/hr *
    e. cm/cm^2/hr.

988. Fatigue cracks in metals normally start at
    a. Centre of the specimen
    b. Core of the specimen
    c. Ends of the specimen
    d. Surface of the specimen *
    e. Any spot in the specimen.

989. Which material has the best damping capacity
    a. High speed steel
    b. Stainless steel
    c. Mild steel
    d. Cast iron *
    e. Diamond.

990. To check the performance of a substance in deep drawing, the test usually conducted is
    a. Tensile test b. Fatigue test
    c. Izod test d. Charpy test
    e. Cupping test.*

991. Which is the heaviest ?
    a. Electron b. Neutron
    c. Positron d. Atom *
    e. Proton.

992. The size of coarse grains in metals is
    a. > 1 mm b. > 0.5 mm
    c. > 0.05 mm * d >0.005 mm
    e. > 0.0005 mm.

993. Number of isotopes for iron is
    a. 1 b. 2
    c. 3 d. 4 *
    e. Nil.

994. Which of the following is the lightest ?
    a. Molecule b. Atom
    c. Neutron d. Electron *
    e. Proton.

995. In plain carbon steel as the percentage of carbon increases from 0.2% to 0.8% which of the following decreases ?
    a. Brinell hardness number
    b. Tensile strength
    c. Percentage elongation *
    d. All of the above
    e. None of the above.

996. Machining properties of brass can be improved by the addition of
    a. Aluminium b. Lead *
    c. Carbon d. Zinc
    e. Chromium.

997. Which of the following is not the characteristic property of aluminium ?
    a. Lightness
    b. Good electrical conductivity
    c. High thermal conductivity
    d. Resistance to corrosion
    e. Least affinity for oxygen.*

998. Galena is the ore for
    a. Aluminium b. Copper
    c. Zinc d. Lead *
    e. Germanium.

999. For heavy loads in aircraft bearings the material used with lead to reduce the risk of seizure, is
    a. Iron b. Silver *
    c. Copper d. Tin
    e. Zinc.

1000. As compared to steel the tensile strength of wood is usually
    a. Half b. One third
    c. $\frac{1}{4}$ or $\frac{1}{5}$ d. $\frac{1}{10}$ to $\frac{1}{15}$. *

1001. Compressive strength of wood is usually
    a. More along the grains *
    b. More across the grains
    c. Equal in all directions
    d. Maximum at 45° to the direction of grains
    e. Depends on moisture content.

1002. Which adhesive is used for plywood work ?
a. Gum b. Guar gum
c. Fevicol * d. Castor oil
e. Any greasy material.

1003. Which is expected to be strongest in tension ?
a. Piano wire * b. Mild steel wire
c. Aluminium wire d. Stainless steel wire
e. Brass wire.

1004. DIN standards are used in
a. India b. Germany *
c. Britain d. France
e. USSR.

1005. In an one component system containing two phases, at equilibrium the number of degrees of freedom would be
a. GOST * b. UNI
c. JIS d. AFNOR
e. CSN.

1006. In an one component system containing two phases, at equilibrium the number of degrees of freedom would be
a. 1 * b. 2
c. 3 d. 4
e. Infinite.

1007. At 543°K the vapour pressure of the pure solids metals are

$P^{\circ}C_d = 1.5\text{ N/m}^2, and$

$P^{\circ}M_g = 0.10\text{ N/m}^2$

In an alloy of 10% M_g in cadmium, the activities are

$aC_d = 0.890$ and

$\mathrm{aM_g} = 0.044.$

The ratio of partial pressures $\frac{\mathrm{pC_d}}{\mathrm{pM_g}}$ will be

a. 0.3 b. 3.0
c. 30 d. 300
e. 3000.*

1008. Which of the following material has highest specific gravity ?
a. Brass b. High carbon steel
c. Lead * d. Aluminium
e. Copper.

1009. Which of the following material has lowest specific gravity ?
a. Brass
b. Copper
c. High carbon steel
d. Zinc
e. Aluminium.*

1010. Viscoelastic materials show behaviour which is
a. Time dependent *
b. Independent of time
c. Elastic d. Inelastic
e. Plastic.

1011. In Brinell hardness testing, while determining hardness of aluminium
a. Indenting ball of smaller diameter is used
b. Time of loading is reduced
c. P/D^2 ratio of 30 is used
d. Load on the indenter is reduced *
e. P/D^2 ratio of 5 is used.

1012. Isotropic materials have
a. Same elastic properties in all directions *
b. Different elastic properties in different directions
c. Variable thermal as well as electrical conductivity
d. Different compressive and tensile stresses at different locations in the same material
e. Cannot take shear as well as tensile stress.

1013. Super conductors
a. Are non-metallic substances
b. Exist at temperatures below 10°K *
c. Are the purest forms of metals
d. Are the density metals without voids
e. Are non-crystalline.

1014. In which of the following case creep is an important consideration ?
a. Exhaust valve of a diesel engine
b. Blades of a steam turbine *
c. Flywheel of a petrol engine
d. Piston of an air compressor
e. Shaft of a centrifugal compressor.

1015. The phenomenon of 'weld decay' is associated with
a. Cast iron b. Manganese steels
c. Aluminium alloys d. Brass
e. Stainless steels.*

1016. Which of the following material has least coefficient of expansion ?
a. Y-alloy b. Invar *
c. Brass d. Manganin
e. Dead mild steel.

1017. All of the following are destructive tests on materials EXCEPT :
a. Cupping b. Tensile test
c. Charpy test
d. Shore's scleroscope hardness test *
e. Fatigue test.

1018. Which of the following materials demonstrate viscoelastic behaviour ?
a. Rubber b. Glass
c. Plastics
d. Non-crystalline organic polymers *
e. All of the above.

1019. Which of the following material can withstand maximum shocks without failure ?
a. White cast iron b. Malleable cast iron *
c. Chilled cast iron d. Gray cast iron
e. Pig iron.

1020. Which of the following is the hardest material ?
a. High speed steel b. Stainless steel
c. Cemented carbide d. Gold
e. Diamond.*

1021. Which of the following has the highest malleability?
a. Silver * b. Brass
c. Stainless steel d. Zinc
e. Aluminium.

1022. Which of the following has the highest malleability?
a. Cast iron b. Copper
c. Aluminium d. Lead *
e. Brass.

1023. Hot hardness of high speed steels increases due to the addition of
a. Tungsten * b. Phosphorous
c. Chromium d. Vanadium
e. None of the above.

1024. Which of the following pipe will corrode easily ?
a. Stainless steel pipe b. Lead pipe
c. Copper pipe d. ERW pipe *
e. GI pipe.

1025. The fatigue limit of a shaft cannot be increased by
a. Under stressing
b. Surface decarburisation *
c. Shot peening
d Nitriding of the surface
e. Cold working.

1026. Which of the following metals has high tendency to get work hardened ?
a. Brass * b. Silver
c. Copper d. Lead
e. Aluminium.

1027. Which of the following is the major constituent of corundum ?
a. Carbon b. Diamond
c. SiO_2 d. $MgCl_2$
e. Al_2O_3.*

1028. Which of the following alloy does not contain tin ?
a. Gun metal b. Phosphor bronze
c. Fusible plug material d. White metal *
e. All of the above.

1029. Lead is used for joining pipes made of
a. Cold iron steel b. Cast iron *
c. Concrete d. Asbestos cement
e. Vitrified clay.

1030. If a simple molecule is to be able to combine with other molecules to form polymers, which of the following must be true ?
I. The possibility must exist that the molecule can form reasonably easily at least two additional bonds
II. There must be one or more atoms in the molecule that can form several bonds
III. At least some of the bonds in the molecule must be ionic
a. II only b. I and II only *
c. II and III only d. I and III only
e. I, II and III.

1031. What is the atomic or ionic characteristic that determines the elements of which the atom or iron is representative ?
a. The number of protons *
b. The number of neutrons
c. The number of electron
d. The mass.

1032. Which of the following factor has the least effect on the electrical conductivity of wires made of copper alloy ?
a. Method of forming the wire
b. Temperature
c. Alloying element
d. Intensity of any incident light.*

1033. The atomic number of a certain element is 83. An atom of this element must contain
a. 42 protons and 41 electrons
b. 83 neutron
c. 1 neutron, 41 electrons and 41 protons
d. 83 electrons *
e. None of the above is valid.

1034. The graphite rods in a nuclear pile
a. Convert fast moving neutrons into thermal neutrons *
b. Furnish alpha particles
c. Furnish alpha beta particles
d. Furnish neutron to fission U^{235}
e. Undergo combustion which triggers the fission reaction.

1035. A radio isotope has a half life of 20 days, after 40 days the fraction of pure isotope which remains will be
a. $\frac{5}{8}$ b. $\frac{11}{24}$
c. $\frac{1}{4}$ d. $\frac{1}{3}$ *
e. $\frac{1}{5}$.

1036. If the major quantum number of an atom is three, it possesses
a. Only s and p electrons
b. Only s electrons
c. Only s, p and d electrons *
d. Only p electrons
e. None of the above is true.

1037. All of the following are examples of ceramic materials EXCEPT :
a. Bakelite * b. Aluminium oxide
c. Magnesium oxide d. Glass

1038. In Fig. 20 which curve is expected to represent the ductility for steels
a. Curve A * b. Curve B
c. Curve C d. Curve D
e. Curve E.

1039. The specific gravity of cast iron is closer to
a. 3 b. 5
c. 7 * d. 9
e. 11.

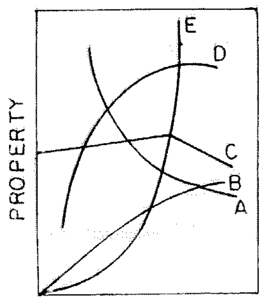


Fig. 4

1040. When a Ge-crystal is doped with phosphorus atom, it becomes
a. P-type semi-conductor
b. N-type semi-conductor *
c. Photo sensitive
d. An insulator
e. A ferrite.

1041. Cadmium sulphide cell is a
a. Photo conductive cell *
b. Solar cell
c. Photovoltaic cell
d. Thermocouple
e. Photo emissive cell.

1042. Which of the following is incorrect for diamond ?
a. An allotrope of graphite
b. Insoluble in all solvents
c. White in colour
d. Densest form of carbon *
e. Transparent.

1043. Which of the following can have positive or negative charge ?
a. Electron b. Iron *
c. Hole d. Neutron
e. Isotope.

1044. Which of the following colour of light has the least wavelength ?
a. Red b. Violet *
c. Green d. Orange
e. Blue.

1045. An atom containing an odd number of electrons is said to be
a. Diamagnetic b. Hypermagnetic
c. Paramagnetic * d. Ferromagnetic
e. Dielectric.

1046. A solution of NaOH conducts electricity because NaOH is
a. A dielectric b. A non-electrolyte
c. A strong electrolyte * d. A week electrolyte
e. None of the above.

1047. Heavy water is obtained byM
a. Rapid evaporation of water
b. Slow evaporation of water
c. Repeared purification
d. Low temperature, low pressure distillation
e. Prolonged electrolysis of water.*

1048. Identify the correct relation
a. Mass number - Atomic number = Number of neutrons *
b. Mass number - Atomic number = Number of protons
c. Number of neutrons - Number of protons = Mass number
d. Number of electrons outside the nucleus - Number of proton = Mass number
e. None of the above.

1049. Laser is a device to produce
a. Beam of white light
b. Beam of monochromatic light
c. Coherent light *
d. Microwaves
e. X-rays.

1050. Which of the following is not a semi-conductor ?
a. Silicon b. Tetraethyl lead *
c. Gallium Arsenide d. Germanium
e. All of the above.

1051. A hydrogen atom has
a. Two electrons
b. No neutrons *
c. No protons
d. One each electron, neutron and proton
e. None of the above.

1052. Which of the following ray has least wavelength ?
 a. Cosmic rays * b. X-rays
 c. Ultraviolet rays d. Infra-red rays
 e. Yellow light rays.

1053. X-rays cannot penetrate through
 a. Copper b. Lead *
 c. Wood d. Paper
 e. Brass.

1054. Which of the following rays are neither deflected by electric field nor by magnetic field ?
 a. $\alpha - rays$ b. $\beta - rays$
 c. $\gamma - rays$ * d. $\text{X} - rays$
 e. None of the above.

1055. Austenite is
 a. F.C.C. iron with nearly 2% (max.) carbon in solid solution.*
 b. B.C.C. iron with nearly 0.025% (max.) carbon in solid solution
 c. B.C.C. iron with nearly 1% carbon in solid solution
 d. None of the above.

1056. Silicon steel used for electrical purposes has silicon percentage of
 a. 0.5% b. 1.5%
 c. 2.5% d. 3.4% *
 e. 13.4%

1057. Which of the following materials have maximum magnetic permeability ?
 a. Pure iron
 b. 4% silicon steel
 c. Grain oriented Si-Fe *
 d. Iron carbide.

1058. In fibre glass reinforced plastics, the glass fibres are primarily used to improve
 a. Mechanical properties of plastics *
 b. Electrical properties of plastics
 c. Thermal properties of plastics
 d. Surface properties of plastics
 e. None of the above.

1059. The Miller indices of the diagonal plane of a cube are
 a. 110 * b. 111
 c. 100 d. 000
 e. 010.

1060. Dislocations in materials are
 a. Point defects b. Line defects *
 c. Planer defects
 d. Either point or planer defects.
 e. Either point, line or planer defects.

1061. The resistivity of electrical conductors is most affected by
 a. Temperature
 b. Pressure
 c. Composition *
 d. Temperature and pressure
 e. Pressure or composition.

1062. Line imperfection in a crystal is called
 a. Schottky defect b. Frenkel defect
 c. Edge dislocation * d. Any of the above
 e. None of the above.

1063. Selenium is
 a. Intrinsic semi-conductor *
 b. Extrinsic semi-conductor
 c. P-type semi-conductor
 d. N-type semi-conductor
 e. None of the above.

1064. Which of the following is p-type semi-conductor ?
 a. Selenium
 b. Silicon doped with phosphorous
 c. Silicon doped with gallium *
 d. All of the above
 e. None of the above.

1065. The electrical resistance of a semi-conductor
 a. Increases with temperature
 b. Decreases with temperature *
 c. Does not change with temperature.

1066. The semi-conductors have electrical conductivities of the following order (ohm- cm^{-1})
 a. 10^{-20} b. 10^{-15}
 c. 10^{-3} * d. 10^{4}
 e. 10^{15}

1067. Polystrene at room temperature is
 a. Brittle * b. Malleable
 c. Ductile d. Soft.

1068. Which of the following method cannot be used for thermoplastic materials ?
 a. Extrusion b. Blow moulding *
 c. Injection moulding d. All of the above.

1069. Which of the following method can be used for thermoplastic materials ?
 a. Blow moulding
 b. Casting
 c. Calendering *
 d. Compression moulding.

1070. Plastic are
 a. Good conductors of heat and bad conductors of electricity
 b. Bad conductors of heat and good conductors of electricity
 c. Good conductors of heat as well as electricity
 d. Bad conductors of heat as well as electricity *
 e. Semi-conductors.

1071. Polymers
 a. Can be vaporised as well as recycled
 b. Can neither be vaporised nor recycled *
 c. Can be vaporised but cannot be recycled
 d. Can be recycled but cannot be vaporised.

1072. Thermosetting polymers are
a. Injection moulded b. Extruded
c. Cast moulded * d. None of the above.

1073. Polysterene is
a. An ester b. An alcohol
c. A hydrocarbon * d. An alkyl halide.

1074. Which of the following polymer is crystalline ?
a. Polyethylene *
b. Polymethyl metacrylate
c. Polyvinyl chloride
d. Polyvinylidene chloride.

1075. Neoprene is
a. Rubber b. Plastic
c. Rubber like plastic * d. None of the above.

1076. Phenol and formaldehyde are polymerised to a resultant product known as
a. PVC b. Bakelite *
c. Polyester d. None of the above.

1077. Polyethylene is produced by
a. Condensation polymerization
b. Addition polymerization *
c. Copolymerization of ethylene manomers
d. None of the above.

1078. Thermoplastic and thermoset polymers differ in
a. Glass transition temperature
b. Thermal behaviour *
c. Mechanical behaviour
d. All of the above.

1079. Which of the following class of materials are good conductors of heat and electricity ?
a. Metals * b. Ceramics
c. Polymers d. Dielectrics.

1080. The crystal structure of a material can be studied by
a. Electron microscope
b. X-ray diffraction *
c. Electron probe X-ray microanalyser
d. All of the above.

1081. The common household glass is
a. Soda lime glass * b. Borosilicate glass
c. High silica glass d. Lead glass.

1082. The structure of common glass is
a. Amorphous * b. Partially crystalline
c. Fully crystalline d. None of the above.

1083. The main constituent of glass is
a. SiO_2 * b. B_2O_3
c. Al_2O_3 d. $CaCo_3$
e. $Mg(HCO_3)_2$.

1084. In a glass metal seal the two components must match with respect to their
a. Hardness b. Thermal expansion *
c. Ductility d. Fatigue strength.

1085. In reinforced concrete, steel rods are used to increase
a. Tensile strength *
b. Compressive strength
c. Shear strength
d. None of the above.

1086. Shot blasting is the process for the cleaning of
a. Moulding sand b. Cores
c. Castings * d. Pattern
e. Welded components.

1087. Cold worked components are generally subjected to
a. Annealing * b. Hardening
c. Shot peening d. Sherodising
e. Tempering.

1088. Which of the following does not contain copper as one of the alloying elements ?
a. Monel metal b. Perminivar
c. Nichrome * d. Manganin
e. All of the above.

1089. Silicon steel is widely used in
a. Automobile industry
b. Electrical industry *
c. RCC work
d. Channel and other section for structural fabrication
e. All of the above.

1090. Just as strong is opposite to weak, similarly brittle is opposite to
a. Rigid b. Elastic
c. Tough * d. Hard
e. Soft.

1091. As per ISS : designation T 70 W 18 4V 1 is
a. Low carbon steel b. High speed steel *
c. Free cutting steel d. Silicon steel
e. Stainless steel.

1092. Copper sheets are manufactured by
a. Extruding b. Drawing
c. Rolling * d. Sintering
e. Deep drawing.

1093. The main constituent of dynamite is
a. Sulphur b. Potassium chlorate
c. Oxygen d. Nitroglycerine *
e. Sodium nitrate.

1094. The material for wire drawing should have
a. High hardness b. High ductility *
c. High melting point d. Low boiling point
e. Stiffness.

1095. Gamma iron has
   a. Body centred space lattice structure containing 6 atoms
   b. Body centred space lattice structure containing 10 atoms
   c. Face centred space lattice structure with 8 atoms
   d. Face centred space lattice structure with 14 atoms*
   e. None of the above.

1096. The highest percentage of carbon that an iron carbon alloy can have is
   a. 2% b. 3%
   c. 4.4% d. 6.6% *
   e. 12.12%.

1097. Cast iron containing 6.6% carbon is
   a. Black in colour containing only pearlite
   b. Black in colour containing only ferrite
   c. Gray in colour containing pearlite and ferrite only
   d. Whitish containing cementite only *
   e. None of the above.

1098. Which of the following is used for imitation jewellery ?
   a. Silicon bronze b. Babbit alloy
   c. Duralumin d. Aluminium bronze *
   e. Gun metal.

1099. Which of the following aluminium alloy is commonly used for utensils ?
   a. Y-alloy b. Duralumin
   c. Magnalium. d. Babbit alloy
   e. Hindalium.*

1100. Which of the following is a mesomorphous material?
   a. Glass b. Silver
   c. Gold d. Mica *
   e. Brass.

1101. The process of adding impurity to a semi-conductor material is called
   a. Mixing b. Film deposition
   c. Binding d. Doping *
   e. Grouping.

1102. Which of the following is 'donor' impurity for semi-conductors ?
   a. Antimony * b. Aluminium
   c. Boron d. Indium
   e. Callium.

1103. Which of the following is 'acceptor' impurity for semi-conductor ?
   a. Arsenic b. Phosphorous
   c. Boron * d. Antimony
   e. All of the above.

1104. When atoms are hold together by the sharing of valence electrons
   a. They form a covalent bond *
   b. The valence electrons are free to move away from the atom
   c. Each shared electron leaves a hole
   d. Each atom becomes free to move
   e. None of the above.

1105. When a normal atom loses an electron, the atom
   a. Becomes a positive ion *
   b. Becomes a negative ion
   c. Becomes a electrically neutral
   d. Is then free to move about
   e. None of the above.

1106. Eutectic is
   a. a phase transformation in which all the liquid phase transforms on cooling to two solid phases simultaneously *
   b. a phase transformation which occurs above the glass transition temperature
   c. a solid solution of one component in another
   d. None of the above.

1107. A non-crystalline polymer which can be stretched to more than twice its original length and which contracts quickly on releasing the load, is known as
   a. copolymer b. dilatant
   c. plastic d. elastomer.*

1108. Figure of merit is used to
   a. compare the efficiency of thermoelectric materials*
   b. measure the extent of doping of intrinsic semi-conductors
   c. compare the extent of purity of semi-conductor materials
   d. none of the above.

1109. When the temperature of a semi-conductor is reduced to absolute zero
   a. all electrons become free
   b. electrons move at higher velocities
   c. all valence electrons remain in the valence band *
   d. all valence electrons shift to forbidden gap.

1110. Burger's vector is
   a. estimation of force of substitutional atoms
   b. a defect in crystal structure
   c. a property of dislocations *
   d. none of the above.

1111. All of the following are point defects EXCEPT :
   a. vacancies b. dislocations *
   c. interstitial d. isolated impurities.

1112. Ligancy is
   a. the number of atoms (or ions) surrounding and touching a central atom *
   b. a covalent bond between two atoms
   c. the angle between the two closest directional bond of an atom
   d. none of the above.

1113. The statement that, at equilibrium, the number of phases plus the degrees of freedom must equal the number of components plus two is known as
   a. Gibbs phase rule * b. Lever rule
   c. Fick's rule d. Heisenberg rule.

1114. A ductile fracture is usually not preceded by
a. plastic flow
b. deformation
c. noise *
d. large amounts of non-recoverable energy absorption.

1115. Gel is
a. a polymer having side groups distributed randomly along a vinyl polymer chain
b. a polymer having secondary chains branching from the main molecular chains
c. a solid frame work of colloidal particles linked together and containing a fluid in its interstices *
d. a polymer in which the repeating unit of each molecule has vinyl group.

1116. A composite bar of steel and copper is heated. The copper bar will be under
a. compression * b. tension
c. torsion d. shear.

1117. In Charpy impact test, the specimen is held as a
a. cantilever
b. simply supported beam *
c. fixed beam
d. hinged beam.

1118. When a piece of metal is made to have a temperature gradient between its two ends, an emf is observed to exist between those ends. The above phenomenon is known as
a. Kelvin effect b. Peltier effect
c. Thomson effect * d. Seeback effect.

1119. Which type of thermostat is generally used in appliances with heating elements ?
a. Bimetallic * b. Magnetic
c. Clad metal d. Ferromagnetic.

1120. Bakelite is
a. a semi-conductor
b. uncombustible *
c. a low resistance conducted
d. a polarised insulator.

1121. The behaviour of visco-elastic materials is
a. time dependent *
b. temperature dependent
c. orientation dependent
d. age-dependent.

1122. When a loop composed of two dissimilar metals could be made to carry a continuous current simply by maintaining the two junctions at different temperatures, the above effect is known as
a. Thomson effect
b. Thompson effect
c. Peltier effect
d. Seeback effect.*

1123. A thermocouple works on which of the following effect ?
a. Thomson effect b. Seeback effect *
c. Peltier effect d. Joule effect.

1124. When a current is passed through the junction of two different metals, heat is absorbed or liberated depending on the direction of the current. The above phenomenon is known as
a. Kelvin effect b. Joule's effect
c. Peltier's effect * d. None of the above.

1125. Which of the following material can be used at temperatures above 100^{o}C ?
a. Polythene b. Teflon *
c. Rubber d. Paraffin wax.

1126. Which of the following material can be used for temperatures upto 500^{o}C ?
a. Empire cloth b. Paper oiled
c. Mica * d. Polythene.

1127. Which of the following is the ferroelectric material ?
a. Rochelle salt
b. Barium titanate
c. Potassium dehydrogen phosphate
d. All of the above *

1128. The Curie point for Rochelle salt is about
a. 1000^{o}C b. 500^{o}C
c. 240^{o}C * d. Absolute zero.

1129. Materials which lack permanent magnetic dipoles are called
a. diamagnetic * b. ferromagnetic
c. semi-magnetic d. none of the above.

1130. When the atomic magnetic moments are randomly oriented in a solid, its magnetic behaviour is termed as
a. polycrystalline b. anti-ferromagnetic
c. paramagnetic * d. semi-magnetic.

1131. The structure of a semi-conductor resembles that of a
a. circle b. rhombus
c. diamond * d. triangle.

1132. Which type of electron pair exists in a semi-conductor?
a. Ionic b. Non-ionic
c. Homopolar * d. Hetropolar.

1133. Selenium is an
a. intrinsic semi-conductor *
b. extrinsic semi-conductor
c. p-type semi-conductor
d. n-type semi-conductor.

1134. Silicon doped with phosphorous is an
a. intrinsic semi-conductor
b. extrinsic semi-conductor
c. p-type semi-conductor
d. n-type semi-conductor.*

1135. Silicon doped with gallium is
a. intrinsic semi-conductor
b. extrinsic semi-conductor
c. p-type semi-conductor *
d. n-type semi-conductor.

1136. A material with unequal anti-parallel atomic magnetic moments is
a. an anti-ferromagnetic *
b. ferrimagnetic
c. ferrite
d. non-magnetic.

1137. The permeability of soft iron can be increased by
a. purifying it
b. reducing carbon percentage
c. alloying with cobalt *
d. increasing carbon percentage.

1138. When a ferromagnetic substance is magnetised, small changes in dimensions occur. Such a phenomenon is known as
a. magnetic hysteresis b. magnetic expansion
c. magneto striction * d. magneto-calorisation.

1139. High purity copper is obtained by
a. casting b. rolling
c. induction heating d. electric refining.*

1140. Which variety of copper has the best electrical conductivity ?
a. Pure annealed copper *
b. Hard drawn copper
c. Induction hardened copper
d. Copper containing traces of silicon.

1141. Which variety of copper has the best mechanical strength ?
a. Annealed copper b. Hard drawn copper *
c. Cast copper d. Soft copper.

1142. Nickel is used in
a. cutting tools
b. automatic voltage regulators
c. electrodes of thermionic valves *
d. pressure sensitive elements.

1143. Application of tin is in
a. bulb filaments b. low current fuses *
c. transducers d. hair springs.

1144. By alloying copper with manganese which of the following increase which of the following increases?
a. Specific gravity b. Tensile strength *
c. Melting point d. Electrical conductivity.

1145. Which of the following increases when copper is hard drawn into wires ?
a. Diameter b. Cross-sectional area
c. Resistivity * d. Specific gravity.

1146. Silicon steel are specified as E_{11}, E_{21}, E_{320} etc. In this first figure after E represents
a. percentage of silicon in steel *
b. specific loss in steel at 50 Hz
c. process of manufacturing
d. direction of rolling.

1147. The number of semi-conductors in periodic table is
a. 3 b. 5
c. 7 d. 13.*

1148. Which of the following properties has lower value for copper as compared to aluminium ?
a. Specific gravity b. Melting point
c. Electrical resistivity * d. All of the above.

1149. In ferromagnetic materials
a. the atomic magnetic moments are anti-parallel and unequal
b. the atomic magnetic moments are parallel *
c. the constituent is iron only.
d. one of the constituent is iron.

1150. The intensity of magnetisation M of a ferromagnetic solid
a. is independent of temperature
b. increases with increasing temperature
c. decreases with increasing temperature *
d. depends primarily on method of heating.

1151. Which of the following is not a rare and precious metal?
a. Platinum b. Palladium
c. Tantalum d. semi-conductors.*

1152. Ferri-magnetic materials generally find application as
a. conductors b. insulators
c. resistors d. semi-conductors.*

1153. A piezo electric is
a. a material which become polarised when stressed*
b. a material which changes dimension due to applied field
c. a material that never gets polarised
d. a material in which magnetising force reduces when current flowing is increased.

1154. Tensile strength of plywood is
a. more along the grains and less across the grains
b. less along the grains and more across the grains
c. nearly same in all directions *
d. maximum in a direction at 45^{o} to the longitudinal axis.

1155. Chir wood yields ....wood and Shisham yields ....wood
a. soft .... hard *
b. hard .... soft
c. soft .... soft
d. hard .... hard.

1156. Average life of first class timber is around
a. 1 to 2 years b. 3 to 5 years
c. 10 to 15 years * d. 25 to 50 years.

1157. Basic factor which contributes to a brittle-cleavage type of fracture is
a. a triaxial state of stress
b. a low temperature
c. a high strain rate
d. all of the above.*

1158. Constantant is an alloy of
a. Nickel and chromium
b. Copper and nickel *
c. Copper and chromium
d. Iron, manganese and chromium.

1159. The magnetic permeability is maximum for
a. paramagnetic materials
b. ferromagnetic materials *
c. diamagnetic materials.

1160. Which of the following is a composite material ?
a. Y-alloy b. High speed steel
c. Tungsten carbide
d. Fibre reinforced plastic.*

1161. Which of the following is the characteristic of ceramic materials ?
a. Malleability and ductility
b. Hardness and brittleness *
c. Elasticity and plasticity
d. Porosity and flexibility.

1162. Materials in order of reducing electrical conductivity are
a. Aluminium, Silver, Gold, Copper
b. Gold, Silver, Copper, Aluminium
c. Copper, Silver, Gold, Aluminium
d. Silver, Copper, Gold, Aluminium.*

1163. Which of the following timber is used for sports goods?
a. Mulberry * b. Mahogany
c. Sal d. Deodar.

1164. The moisture content in a well seasoned timber is
a. 4 to 6 percent b. 6 to 8 percent
c. 10 to 15 percent d. 20 to 25 percent *

1165. The strength of timber is
a. less along the grains more across the grains
b. more along the grains less across the grains *
c. same in all directions
d. maximum in a direction at 45^{o} to the longitudinal axis.

1166. Which of the following material can be used for the filaments in incandescent lamps ?
a. Carbon b. Tungsten *
c. Tantalum d. Any of the above.

1167. The melting point of carbon is
a. 1800^{o}C b. 2200^{o}C
c. 3500^{o}C * d. 5500^{o}C.

1168. Four materials are
I. Metals II. Ceramics
III. Polymers IV. Paper.
Which of these is (are) good conductors of heat as well as electricity ?
a. I only * b. II and III only
c. III and IV only d. I, III and IV only.

1169. German silver is mainly used for
a. utensils b. pipes
c. valves d. artificial jewellary.*

1170. A ....is the product of the first break down of the ingot
a. slab b. pig
c. bloom * d. billet.

1171. Which one of the following is a thermosetting plastic?
a. Diallylphthalate * b. Polyethylene
c. Polypropylene d. Cellulose.

1172. Practically all fatigue failures start at
a. the core b. the surface *
c. half the depth d. near the centroid.

1173. A knoop indentor is a diamond ground to a
a. cylindrical form b. pyramidal *
c. prismoidal form d. needle form.

1174. The dependence of properties on orientation is called
a. grain growth b. cupping
c. delineation d. anisotropy.*

1175. The order in which events lead to fatigue failure are
a. crack growth, fracture, nucleation
b. fracture, crack growth, nucleation
c. nucleation, crack growth, fracture *
d. crack growth, nucleation, fracture.

1176. Titanium alloys are
a. magnetic
b. prone to corrosion
c. are cheap and easy to machine
d. alloys with high strength/weight ratio.*

1177. Magnesium alloys
a. are light *
b. are magnetic
c. are easy to machine
d. prone to corrosion.

1178. Magnesium alloy AZ 31 B - H 24
a. contains 3 percent aluminium and 1 percent zinc *
b. is magnetic
c. cannot be strained hardened
d. is ductile.

1179. Find the odd one out
a. Polyester b. Phenolic
c. Silicone d. Polyvinyl chloride.*

1180. Find the odd one out
a. Acetal b. Nylon
c. Polyester * d. Polyurethane.

1181. Delta iron occurs in the temperature range of
a. 400°C to 700°C b. 550°C to 850°C
c. 1400°C to 1530°C * d. 1640°C to 1750°C.

1182. A steel with 0.8% carbon and 100% pearlite is called
a. eutectoid steel b. hypo-eutectoid steel
c. hyper-eutectoid steel* d. none of the above.

1183. An allotropic material has
a. different crystal structure at different temperatures*
b. fixed structure at all temperatures
c. atoms distributed in random pattern
d. none of the above.

1184. Alloys of copper with lead
a. improve machinability *
b. increase its hardness
c. improve weldability
d. increase strength and ductility.

1185. The process in which both carbon and nitrogen are absorbed by the metal surface to get it hardened is known as
a. carburising b. cyaniding
c. flame hardening * d. induction hardening.

1186. Which of the following heat treatment process is used for casting ?
a. Tempering b. Flame hardening
c. Carburizing d. Normalising.*

1187. Iron-carbon alloys containing 1.7 to 4.3 % carbon are known as
a. eutectic cast irons
b. hypo-eutectic cast iron
c. hyper-eutectic cast iron *
d. none of the above.

1188. In a unit cell of a face centred cubic space lattice the total number of atoms is
a. 6 b. 8
c. 14 * d. 26.

1189. A unit cell having nine atoms is called
a. face centred cubic space lattice
b. body centred cubic space lattice *
c. close packed hexagonal space lattice
d. none of the above.

1190. A space lattice found in α -iron is known as
a. body centred cubic space lattice *
b. face centred cubic space lattice
c. close packed hexagonal space lattice
d. none of the above.

1191. Cold shortness in steels is caused by
a. S b. P *
c. Mn d. Si.

1192. Dow metal is an alloy of
a. magnesium aluminium and copper *
b. tin, lead and antimony
c. copper, zinc and molybdenum
d. silver, gold and platinum.

1193. In blast furnace charge scrap is added to
a. reduce the quantity of slag
b. have effective control over the grade of cast iron produced *
c. reduce coal consumption
d. make the furnace temperature uniform.

1194. Coking coal is compared to ordinary coal has
a. large surface area and low heating value
b. less carbon and high ash content
c. high calorific value and low ash content *
d. high specific heat and low carbon content.

1195. Which of the following property of PVC is of prime importance ?
a. Strength b. Appearance
c. Colour d. Non-in Flammability.*

1196. Polysters belong to the family of
a. celluloses
b. phenolics *
c. thermosetting plastics
d. none of the above.

1197. Thermosetting plastics
a. permanently set with heat and cannot be deformed when again subjected to heat *
b. soften on application of heat and can be moulded again
c. are produced on synthesis basis
d. none of the above.

1198. Which process is commonly used for thermo-plastic materials ?
a. Diecasting b. Injection moulding *
c. Shell moulding d. Cold forming.

1199. The melting point of ferrous metals
a. increases with increase in carbon *
b. decreases with increase in carbon
c. increases with decrease in carbon
d. remains constant.

1200. As the impurities are removed, the melting point of iron
a. increases *
b. decreases
c. remains unchanged
d. depends on space lattice arrangement.

1201. Which of the following is preferred for heavy duty bearings
a. Brass b. White metal *
c. Carbon chrome steel d. Cast iron.

1202. White cast iron is produced from grey cast iron by the process of
a. slow heating b. rapid heating *
c. slow cooling d. rapid cooling.

1203. When a low carbon steel is heated upto upper critical temperature
a. the average grain size will be minimum *
b. the average grain size will be maximum
c. the grain size does not change
d. the grain size increases rapidly.

1204. Which structure of a material can be studied by naked eye ?
a. Grain structure
b. Atomic structure
c. Micro structure
d. Macro structure.*

1205. Close packed hexagonal space lattice is found in
a. Chromium tungsten and molybdenum
b. Aluminium, copper and lead
c. Cobalt, antimony and bismuth *
d. Calcium, magnesium and aluminium.

1206. A harder materials is more prone to
a. fracture * b. deformation
c. wear d. none of the above.

1207. Brinell hardness is measured by pressing
a. a spherical ball against a flat surface *
b. a sharp cone against a rough flat surface
c. a spherical ball against a flat or curved surface
d. none of the above.

1208. A conical impression is obtained during Rockwell hardness measurement. The hardness is measured by
a. measuring the area of impression
b. measuring the depth of impression *
c. measuring the area of intersection of impression and surface
d. none of the above.

1209. Hardness is the measure of
a. UTS * b. yield strength
c. toughness d. none of the above.

1210. The impact strength is measure of suitability for
a. C.I. b. structural steel *
c. stainless steel d. none of the above.

1211. For determination of impact strength a standard specimen is given a blow in such a way that stress at notch is
a. compression b. shearing
c. tension * d. none of the above.

1212. A comprehensive impact test places the specimen under worst conditions of
a. unspecified strain rate and stress concentration
b. specified strain rate and stress concentration
c. unspecified strain rate, stress concentration and temp.
d. specified strain rate, stress concentration and temp.*

1213. A good impact strength is indication of
a. good fatigue behaviour
b. good fatigue resistance
c. good ductility *
d. none of the above.

1214. A fatigue fracture is characterised by
a. brittle fracture * b. ductile fracture
c. irregular surface d. none of the above.

1215. Fatigue strength is least affected by
a. temperature
b. stress concentration
c. magnitude of mean stress
d. frequency.*

1216. Fatigue strength of a part can be increased by
a. having surface well finished *
b. maintaining temperature at lowest possible level
c. superimposing static stress
d. none of the above.

1217. Creep is essentially a
a. high temperature phenomenon
b. medium temperature phenomenon
c. low temperature phenomenon
d. phenomenon which is independent of temp *.

1218. Creep phenomenon becomes important at
a. temperature which is half of melting point temp. °C
b. temperature which is half of melting point temp. K *
c. temperature which is close to melting point temp.
d. none of the above.

1219. Creep plays important role in design of
a. cylinder of an I.C. engine
b. boiler tubings
c. blading of gas turbine *
d. none of the above.

1220. Hot shortness in steels is caused by
a. S * b. P
c. Mn d. none of the above.

1221. Tendency to hot shortness in steels in curbed by
a. S b. P
c. Mn * d. none of the above.

1222. The alloying element in steels which reduces free O_2 and improves permeability is
a. S b. P
c. Mn d. Si.*

1223. The alloying element in steel which increases hardness but does not sacrifice ductility is
   a. Cr b. Mo
   c. Ni * d. none of the above.

1224. The alloying elements in steel which increase toughness are
   a. Ni and Cr b. Ni and Si *
   c. Ni and Mo d. none of the above.

1225. With increasing C %age the mechanical properties that are not affected beyond 0.8% C are
   a. Hardness and UTS
   b. %age elong and impact strength
   c. UTS and %age elong
   d. UTS and impact strength.*

1226. Pearlite phase in steel is made up of
   a. alternate layers of ferrite and cementite *
   b. alternate layers of ferrite and martensite
   c. alternate layers of martensite and cementite
   d. none of the above.

1227. Mo, Mn, Ni and si are the alloying element which increase the hardness of steel. For achieving same percentage of increase in hardness the percentage compositions of these elements increase in the order
   a. Si, Mn Ni Mo *
   b. Mn Si Ni Mo
   c. Ni Mo Si Mn
   d. none of the above.

1228. Which is the most effective alloying element in increasing the hardness of steel for same %age of composition
   a. Mo b. Ni *
   c. W d. none of the above.

1229. Which is the least effective alloying element in increasing the hardness of steel for same %age composition
   a. Mn b. Mo
   c. Cr * d. none of the above

.

1230. Hardness of martensite phase in steel increases with increase in C %age . The greatest change (increase) in hardness is obtained when C %age changes from
   a. 0.2 to 0.4 * b. 0.4 to 0.6
   c. 0.6 to 0.8 d. none of the above.

1231. In Brinell hardness tester the load for aluminium is
   a. 3000 kg b. 1500 kg
   c. 1000 kg d. 500 kg *
   e. 100 kg.

1232. In Brinell hardness testing the time for loading is
   a. 1 second b. 2 seconds
   c. 5 seconds d. 15 seconds *
   e. 1 minute.

1233. In Brinell hardness testing the minimum thickness of the specimen should be
   a. Less than 5 times the depth of impression
   b. Less than 10 times the depth of impression
   c. Equal to 10 times the depth of impression
   d. More than 10 times the depth of impression *
   e. Thickness of specimen has no relevance to the depth of impression.

1234. The relation between the Brinell hardness number of a substance determined with P/D^2 ratio of 30 to that with P/D^2 ratio of 10 is
   a. $\left(P/D^2\right)_{30} = 3\left(P/D^2\right)_{10}$
   b. $\left(P/D^2\right)_{30} = \frac{1}{3}\left(PD^2\right)_{10}$
   c. $\left(PD^2\right)_{30} = 9\left(PD^2\right)_{10}$ *
   d. $\left(PD^2\right)_{30} = \frac{1}{9}\left(PD^2\right)_{10}$.
   e. No such relation exists.

1235. Indentor used in Vickers hardness testing machine is
   a. 25 mm dia ball
   b. 15 mm dia ball
   c. 10 mm dia ball
   d. Conical indentor with 120^o apex angle
   e. Diamond square- based pyramid.*

1236. Angularity of the square base pyramid in Vickers hardness tester is
   a. 90^o b. 11^o
   c. 120^o d. 136^o*
   e. 150^o.

1237. The property which enables metals to be drawn into wire is known as
   a. Malleability b. Ductility *
   c. Straining d. Plastic deformation
   e. Elastic deformation.

1238. Slow plastic deformation of metals under a constant stress is known as
   a. Fatigue b. Proof deformation
   c. Gradual deformation d. Creep *
   e. Endurance failure.

1239. In which of the following cases creep is an important consideration ?
   a. Cast iron water pipes
   b. Cycle chains
   c. Gas turbine blades *
   d. Steam engine flywheel
   e. All of the above.

1240. Which of the following is a non-destructive test ?
a. Charpy test
b. Izod impact test
c. Tensile test
d. Cupping test
e. X-ray test.*

1241. The major load and indentor used for Rockwell B scale is
a. 100 kg, $\frac{1}{10}$" ball *
b. 150 kg, $\frac{1}{16}$" ball
c. 150 kg, $\frac{1}{8}$" ball
d. 100 kg diamond pyramid
e. 60 kg, $\frac{1}{8}$" ball.

1242. Spherical metal powders are usually produced by
a. Electrolytic process
b. Automization *
c. Reduction
d. Oxidation
e. Milling.

1243. Normal mercury thermometer can be used upto
a. 100°C
b. 212°C
c. 300°C *
d. 500°C
e. 800°C.

1244. The upper range of mercury thermometer can be increased by
a. Increasing tube diameter
b. Providing steel tube
c. Taking into account expansion of tube
d. Filling the stem with nitrogen under pressure *
e. Range cannot be increased.

1245. The phenomenon of emf development between two different metals placed in contact is known as
a. Seeback effect *
b. Thomson effect
c. Peltier effect
d. Kelvin effect
e. Thermocouple effect.

1246. Which thermocouple can measure highest temperature ?
a. Copper-constantan
b. Iron constantan
c. Chromel-alumel
d. Platinum-rhodium
e. Tungsten-molybdenum.*

1247. The principle on which a disappearing filament type pyrometer works is known as
a. Kirchhoff's law
b. Fourier's law
c. Wien's law *
d. Peltier effect
e. Seeback effect.

1248. Under identical values of cold and hot junction temperatures which thermocouple gives the highest output
a. Iron constantan
b. Nickel nimo
c. Chromel-constantan *
d. Platinum-platinum-rhodium
e. All give equal output.

1249. The measurement junction of a thermocouple is taken from an environment of 300° to 600°C. If time constant of the thermocouple is 1 second, temperature indicated by it, in °C, after 1 second would be about
a. 100
b. 400
c. 457
d. 497 *
e. 600.

1250. An instrument which is used for measuring temperature variations by change in a metallic resistance is called a
a. Thermopile
b. Bolometer *
c. Thermocouple
d. Thermo-generator
e. Thermo-galvanometer.

1251. A solder consists of
a. Lead and tin *
b. Tin and white metal
c. Zinc and lead
d. Zinc and tin
e. Tin and antimony.

1252. The flux used in brazing is usually
a. Common salt
b. Lime
c. Borax *
d. Alum
e. None of the above.

1253. Which metal has the lowest melting point ?
a. Iron *
b. Copper
c. Silver
d. Magnesium
e. Aluminium.

1254. Which metal has the lowest melting point ?
a. Magnesium *
b. Silver
c. Nickel
d. Brass
e. Aluminium bronze.

1255. Which of the following metals has highest specific gravity ?
a. Iron
b. Silver *
c. Copper
d. Aluminium
e. Brass.

1256. Which of the following metal has the lowest specific gravity ?
a. Monel metal
b. Magnesium *
c. Copper
d. Bronze
e. Cast iron.

1257. The process of providing zinc coating on steel pipes is known as
a. Pickling
b. Spheroidising
c. Cold working
d. Galvanising *
e. Blistering.

1258. Galvanising layer usually provides protection in the range of water
a. 1 to 7
b. 7 to 14
c. 1 to 14
d. 6 to 11 *
e. Complete protection is provided.

1259. Uniformity of zinc coating on pipes is tested by
   a. Dipping the sample in water
   b. Dipping the sample for 1 minute in concentrated hydrochloric acid
   c. Dipping the sample for 1 minute in neutral copper sulphate solution *
   d. Dipping the sample for 10 minutes in calcium hydroxide solution
   e. By passing electric current for 1 hour.

1260. Which of the following is usually not a constituent of paints ?
   a. Career *   b. Vehicle
   c. Pigment   d. Drier
   e. None of the above.

1261. Attack of steel is increased by
   a. Salt solution below a paint coat
   b. Invisible moisture film present prior to painting
   c. Graphite in the priming coat
   d. Loose rust and partially removed mill scale
   e. All of the above.*

1262. Which of the following material can bear sudden and excessive shocks better ?
   a. Cast iron   b. Pig iron
   c. White iron   d. Wrought iron *
   e. All have same shock bearing capacity.

1263. Percentage of carbon is least in case of
   a. Pig iron   b. Cast iron
   c. Malleable iron   d. Wrought iron *
   e. Steel.

1264. The process used for making steel is
   a. Bessemer converter
   b. Open hearth
   c. Electric arc
   d. High frequency heating
   e. Any of the above.*

1265. In high frequency heating of steel, the heat is generated primarily due to
   a. Eddy currents *   b. Stray magnetic fields
   c. High Voltage   d. High power
   e. High resistance of contact surface.

1266. Eddy currents
   a. Increase with frequency
   b. Increase with square of frequency *
   c. Increase with cube of frequency
   d. Increase with fourth power of frequency
   e. Increase as inverse of frequency.

1267. In eddy current heating of steel, if the depth of heating is to be increased
   a. Frequency must be high
   b. Frequency must be low *
   c. Some resisting material must be applied on the surface of article to be heater
   d. Time of heating should be high
   e. Voltage should be high.

1268. Brinell hardness of nitrided surface may be of the order of
   a. 100   b. 150 to 200
   c. 200 to 250   d. 300 to 450
   e. More than 600.*

1269. The chemical formula of cementite is
   a. FeC   b. Fe_3C *
   c. FeC_3 d. Fe_2C_3
   e. Fe_3C_2.

1270. Which of the following is not true for cementite ?
   a. It is hard   b. It is brittle
   c. It is brilliantly white   d. It is found in steels
   e. It has low melting point.*

1271. A fine grained steel will have the number of grains per square centimeter as
   a. 3 to 6 *   b. 16 to 56
   c. 56 to 100   d. 100 to 150
   e. 150 to 1000.

1272. High carbon steels intended to be quenched in water should have manganese percentage less than
   a. 2 percent   b. 1.5 percent
   c. 1 percent   d. 0.5 percent *
   e. No manganese percent.

1273. In tool steel the percentage of silicon is usually restricted to
   a. 0.2 percent *   b. 0.5 percent
   c. 1 percent   d. 2 percent
   e. 5 percent.

1274. Free cutting steels usually have sulphur content of
   a. 0.002 percent   b. 0.02 percent
   c. 0.21 percent *   d. 2 percent
   e. 10 percent.

1275. In tool steel the sulphur content is usually not allowed to exceed
   a. 0.001 percent   b. 0.035 percent *
   c. 0.35 percent   d. 3.5 percent
   e. 5 percent.

1276. Dead mild steel has carbon percentage of
   a. 1 percent   b. 0.87 to 0.95 percent
   c. 0.5 to 0.65 percent   d. 0.1 to 0.15 percent *
   e. 0.007 to 0.005 percent.

1277. Percentage of carbon in mild steel is
   a. 0.010 to 0.025   b. 0.10 to 0.25 *
   c. 0.8 to 0.85   d. 1.0 to 1.25
   e. 3.0 to 4.50.

1278. Which of the following is usually made of dead mild steel ?
   a. Flanges *   b. Shafts
   c. Fish plates   d. Gears
   e. Spades.

1279. Which of the following is usually made of mild steel?
a. Drop forgings b. Fish plates
c. Shear blades d. Channels *
e. Die blocks.

1280. Which of the following is usually made of high carbon steel ?
a. Hammers * b. Angle iron
c. Solid drawn tubes d Channels.

1281. Cold worked components are generally subjected to
a. Annealing * b. Hardening
c. Shot peening d. Normalising
e. Sherodising.

1282. The stainless steels owe their resistance to corrosion to the presence of
a. Chromium * b. Carbon
c. Manganese d. Sulphur
e. Nickel.

1283. In order to improve machinability of stainless steels
a. 0.2 percent selenium is added
b. 0.35 percent sulphur is added
c. 0.5 percent manganese is added
d. (a) or (b) above.*
e. (b) or (c) above.

1284. The highest percentage of chromium that can be added to steel is usually
a. 12 percent b. 15 percent
c. 18 percent * d. 25 percent
e. 50 percent.

1285. Carbon percentage in cutlery stainless steel is
a. 0.25 to 0.30 percent * b. 0.76 to 0.80 percent
c. 1 percent d. 1.1 to 1.35 percent
e. 1.35 to 1.65 percent.

1286. An operation on steel aimed at softening the steel to improve machinability is known as
a. Softening b. Cold working
c. Shot blasting d. Annealing *
e. Temperature.

1287. Annealing treatment is normally used for
a. Forgings b. Cold worked sheets
c. Wires d. Castings
e. All of the above *.

1288. Chromium percentage in cutlery stainless steel is
a. 6 - 8 percent b. 8 - 10 percent *
c. 11 - 13 percent d. 15 - 18 percent
e. 18 - 20.5 percent.

1289. Which of the following gives a fracture crystalline is appearance ?
a. Steel b. Wrought iron
c. Cast iron * d. All of the above
e. None of the above.

1290. Presence of lead in brass improves
a. Machining properties *
b. Hardenability c. Ductility
d. Malleability e. Fatigue resistance.

1291. Iron ore which is grey to black in colour and is hard and magnetic, is known as
a. Hematite b. Limonite
c. Siderite d. Magnetite *
e. Ironite.

1292. Which iron ore has least percentage of iron
a. Magnetite b. Hematite
c. Limonite d. Siderite *
e. All have almost equal percentage of iron ore.

1293. The flux used in blast furnace while melting iron ore is
a. Carbon b. Oxygen
c. Sodium chloride d. Lime stone *
e. Bauxite.

1294. For each ton of pig iron produced in a blast furnace, the amount of ore used is approximateely.
a. 1 ton b. 2 tons *
c. 5 tons d. 13 tons
e. 12.5 tons.

1295. For each ton of pig iron produced from blast furnace, the lime stone used is approximately
a. 0.01 ton b. 0.1 ton
c. 0.4 ton * d. 1.4 ton
e. 2.55 tons.

1296. For each ton of pig iron produced in blast furnace, the quantity of coke required would be roughly
a. 0.1 ton b. 0.25 ton
c. 0.5 ton d. 1.4 ton *
e. 1.9 ton.

1297. Which of the following is by product from blast furnace ?
a. Slag b. Flue dust
c. Blast furnace gas d. All of the above *
e. None of the above.

1298. The maximum temperature inside a blast furnace gas is of the order os
a. 50ºC b. 1000ºC
c. 1600ºC * d. 2600ºC
e. 3600ºC.

1299. Percentage of iron in pig iron is approximately
a. 99.9% b. 95%
c. 90% * d. 80%
e. 78%.

1300. Which of the following is easiest to bend ?
a. Cast iron b. Grey pig iron
c. Mottled pig iron d. Steel
e. Wrought iron.*

1301. Which of the following gives granular fracture ?
a. Steel * b. Wrought iron
c. Cast iron d. All of the above.
e. None of the above.

1302. Dilute nitric acid applied to a clean fracture of wrought iron gives
a. White stain * b. Greenish stain
c. Blue stain d. Grey stain
e. Black stain.

1303. Dilute nitric acid applied to clean a fracture of white cast iron will produce
a. White stain b. Grey stain
c. Black stain d. Brown stain *
e. Pink stain.

1304. Which of the following is not true in case of white cast iron
a. It is whitish in colour
b. It is strong c. It is hard
d. It is brittle e. It is malleable *

1305. For acid resistance cast iron should have silicon percentage of
a. 1 percent b. 2 percent
c. 10 percent d. 15 percent *
e. 25 percent.

1306. Highest melting point is for
a. Cast iron b. Wrought iron *
c. Mild steel d. High carbon steel
e. Low carbon steel.

1307. Compressive strength is highest in case of
a. Cast iron b. Wrought iron
c. Mild steel d. Low carbon steel
e. High carbon steel.*

1308. Ultimate tensile strength is least in case of
a. Cast iron * b. Wrought iron
c. Mild steel d. Low carbon steel
e. High carbon steel.

1309. Ultimate tensile strength is least in case of mild steel and is of the order of
a. 35 - 45 kg/mm^2 * b. 50 - 60 kg/mm^2
c. 60 - 75 kg/mm^2 d. 75 - 90 kg/mm^2
e. 90 - 100 kg/mm^2

1310. Welding process used in fabrication of car bodies is
a. Arc welding b. Resistance welding *
c. Thermit welding d. Brazing
e. Soldering.

1311. The fastest cooling rate is achieved when steel is quenched in
a. Brine * b. Air
c. Oil d. Water.

1312. Brass in an alloy of
a. Copper and tin b. Copper and zinc *
c. Copper and lead d. Copper and nickel
e. Copper and aluminium.

1313. Bronze is an alloy
a. Copper, lead and tin
b. Zinc, lead and tin
c. Copper, zinc and tin *
d. Zinc, nickel and tin
e. Nickel, aluminium and copper.

1314. Stellite contains
a. Cobalt, chromium and tungsten *
b. Cobalt, vanadium and nickel
c. Nickel, copper and zinc
d. Nickel, zinc and aluminium
e. Copper, tin and lead.

1315. Babbit metal is an alloy of
a. Tin, antimony and copper *
b. Tin, antimony and lead
c. Tin, copper and lead
d. Tin, zinc and copper
e. Lead, zinc and copper.

1316. Bell metal is an alloy of
a. Copper, tin, lead and zinc
b. Copper, antimony, aluminium and zinc
c. Copper, lead and tin
d. Copper and tin *
e. Copper and lead.

1317. Which of the following is the hardest ?
a. Talc b. Fluorite
c. Quartz d. Topaz
e. Corundum.*

1318. Which of the following is the softest material ?
a. Corundum b. Diamond
c. Calcite * d. Quartz
e. Fluorite.

1319. Approximate Brinell Hardness number for talc is
a. 1 b. 2
c. 5 - 10 d. 20 - 30 *
e. 50 - 80 .

1320. Vicker's hardness number of diamond could be of the order of
a. 15000 b. 12000
c. 8000 * d. 4000
e. 800.

1321. Which of the following is a noble metal ?
a. Aluminium b. Stainless steel
c. Nickel d. Platinum *
e. Chromium.

1322. Constantan is an alloy containing
a. Copper and zinc b. Copper and nickel *
c. Zinc and nickel d. Lead and zinc
e. Lead and copper.

1323. Fusible plug for boilers consists of
a. Lead, tin and mercury
b. Copper, lead and tin
c. Zinc, copper and lead
d. Bismuth, lead and tin *
e. Zinc, bismuth and tin.

1324. Nichrome contains
a. Nickel, chromium and vanadium
b. Nickel, copper and vanadium
c. Nickel, and copper
d. Nickel and chromium *
e. Nickel, lead and zinc.

1325. White metal contains
a. Lead and bismuth * b. Lead and zinc
c. Mercury and zinc d. Lead and copper
e. Copper, zinc and mercury.

1326. Major constituent of phosphor bronze is
a. Zinc b. Copper *
c. Lead d. Aluminium
e. Phosphorous.

1327. Invar is an alloy of
a. Iron and nickel * b. Iron and copper
c. Iron and zinc d. Iron and chromium
e. Iron and vanadium.

1328. Which of the following material is used for thermocouple junction?
a. Petwar b. White metal
c. Nichrome d. Magnanin *
e. Invar.

1329. Heating elements of electrical heaters are made of
a. Nichrome * b. Nicheloy
c. Invar d. Tungsten
e. Phosphor bronze.

1330. Standard electrical resistance are made of
a. Constantan * b. Tungsten
c. Phosphor bronze
d. Manganin d. Invar.

1331. Lowest melting point may be expected for
a. Aluminium b. Brass
c. Copper d. Lead *
e. Zirconium.

1332. Highest specific gravity is of
a. Brass b. Copper
c. Lead * d. Steel
e. Titanium.

1333. Modulus of elasticity for steel is approximately
a. 1.2×10^6 kg/cm^2 b. 2×10^6 kg/cm^2 *
c. 12×10^6 kg/cm^2 d. 52×10^6 kg/cm^2
e. 78×10^6 kg/cm^2.

1334. As per IS code, C 65 steel will have carbon percentage of
a. 0.065 percent b. 0.6 to 0.7 percent *
c. 6 to 7 percent d. 00 to 70 percent
e. None of the above.

1335. Which of following is high speed steel ?
a. T 55 Ni 2 Cr 65 Mo 30
b. T 75 W 18 Co 6 Cr 4
c. T 10 Cr 5 Mo 75 V 23
d. T 75 W 18 Co 6 Cr 4 V 1 Mo 75 *
e. None of the above.

1336. Which of the following temperatures represents the tempering temperature for C 30 steel ?
a. 1700°C b. 1400 - 1450°C *
c. 860 - 890°C d. 550 - 660°C
e. 100 - 150°C.

1337. Capacity of a cupola is expressed in terms of
a. Diameter of drum
b. Height of drum
c. Tons of castings it can produce in one charge *
d. Tons of coke it can take in one charge
e. None of the above.

1338. During first charge in cupola the time taken by material to melt is approximately
a. 10 minutes b. Half an hour
c. 1 hour d. $2\frac{1}{2}$ to 3 hours *
e. 5 to 6 hours.

1339. Which of the following is fluxing material for cupola?
a. Limestone b. Fluorspar
c. Soda Ash d. Any of the above *
e. None of the above.

1340. Volume of air required to melt one tone of cast iron in a cupola at N.T.P. is roughly
a. 10 cubic metres of air
b. 100 cubic metres of air *
c. 1000 cubic metres of air
d. 10000 cubic metres of air
e. 100000 cubic metres of air.

1341. Usually the capacity of cupola is
a. $\frac{1}{4}$ to $\frac{1}{2}$ ton b. 1 to 5 tons *
c. 10 to 100 tons d. 100 to 500 tons
e. 500 to 1000 tons.

1342. Which of the following furnaces is not used for non-ferrous materials
a. Pit furnace b. Crucible furnace
c. Cupola *
d. Oil fired tilting furnace
e. Gas fired tilting furnace.

1343. Crucible for melting of metals are made of
a. Cast iron b. Chromium
c. Hard metal d. Graphite *
e. Tungsten.

1344. Cast iron pipes are manufactured by
a. Sand casting method
b. Lost wax method
c. Shell moulding method
d. Die casting method
e. Centrifugal casting method.*

1345. For producing cast iron pipes by centrifugal casting method the core used is
a. Sand core b. Wax core
c. Metallic core d. Clay core
e. No core is used.*

1346. Petrol engine carburetors are manufactured by
a. Sand casting b. Centrifugal casting
c. Shell casting d. Die casting *
e. Lost wax casting.

1347. The charges for sand castings are estimated on the basis of
a. Surface area b. Volume
c. Weight * d. Density
e. Surface area to volume ratio.

1348. Coarse grained steels
a. Are less tough *
b. Are less liable to distortion
c. Have poor machinability
d. Have lesser depth hardening power
e. None of the above.

1349. Fine grained steels
a. Are tougher
b. More ductile
c. Have less tendency to distort on heating
d. Have less tendency to crack in heating
e. All of the above.*

1350. Maximum hardness that can be achieved in plain carbon steel is of the order of
a. 50 Rockwell 'C'
b. 66 - 67 Rockwell 'C' *
c. 80 - 85 Rockwell 'C'
d. 100 - 150 Rockwell 'C'
e. There is no such limit for hardness.

1351. For normalizing, steel is heated to
a. 700^o C b. 900^o C
c. 100^o C below critical temperature
d. Critical temperature
e. 30^o C to 60^o C above critical temperature.*

1352. In which process steel is heated below the critical temperature
a. Annealing b. Normalizing
c. Hardening d. Tempering *
e. Carburizing.

1353. Carbon percentage in steel for carburizing is usually
a. 1.5 percent b. 1 percent
c. 0.8 percent d. 0.6 percent
e. 0.15 percent.*

1354. Which of the following is not a hardening process ?
a. Cyaniding b. Nitriding
c. Spheroidizing * d. Carburising
e. Induction hardening.

1355. During recovery of a cold worked polycrystalline material, dislocations
a. Rearrange * b. Migrate
c. Multiply d. Mostly disappear.

1356. In order to observe the grain size of steel samples under microscope, the magnification should be of the order of
a. 2 b. 10
c. 20 d. 100 *
e. 1500.

1357. If a sample of steel shows excessive hardness after tempering the probable cause could be
a. Insufficient holding time during tempering *
b. Excessive proportion of alloying elements
c. High temperature during tempering
d. Change in volume during cooling
e. None of the above.

1358. There are 14 atoms in a unit cell of
a. Body centred cubic space lattice
b. Face centred cubic space lattice *
c. Close packed hexagonal space lattice
d. All of the above
e. None of the above.

1359. Cracks of a vertical nature and dark coloured fissures in a sample of hardened steel indicate that
a. Steel has been properly hardened
b. Steel has not been properly heated
c. Steel has been burned *
d. Steel has achieved maximum possible hardness in accordance with the carbon percentage
e. Steel contains excessive alloying elements.

1360. A chisel for cutting steel plates is usually
a. Tempered b. Hardened
c. Annealed
d. Tempered and annealed
e. Hardened and tempered.*

1361. On Moh's scale, materials with hardness number less than 4 are
a. Topaz, Corundum, Diamond
b. Talc, gypsum, calcite *
c. Fluorite, Felsper, Talc
d. Felspar, corundum, Diamond.

1362. The slowest cooling rate is achieved when steel is quenched in
a. fused salt b. Air *
c. Brine d. mixture of water.

1363. Warping may be avoided when quenching a long slender piece of work by
a. Holding the work piece between clamps and pouring water on it
b. Holding the work piece vertically over the quenching bath and plunging it straight *
c. Pulling the piece from both ends
d. Holding the piece horizontally in adequate supports
e. None of the above.

1364. Which colour of flame represents the highest temperature ?
a. Dark red b. Bright red
c. Light yellow d. White *
e. Pink.

1365. The coordination number of NaCl is
a. 2 b. 3
c. 6 * d. 8
e. 9.

1366. The property of a metal when the recovery after unloading is complete but not instantaneous is
a. Creep b. Inelasticity
c. Anelasticity * d. Viscoelasticity.

1367. Which hardening process is generally not used for steels ?
a. Induction hardening
b. Age hardening * c. Nitriding
d. Pack carburising e. Cyaniding.

1368. For nitriding, the nitrogen is provided by
a. Heated air b. Ionised air
c. Ammonia * d. Nitrous oxide
e. Nitric acid.

1369. Which allotropic form of iron is magnetic at room temperature ?
a. Alpha iron * b. Beta iron
c. Gamma iron d. Delta iron
e. All of the above.

1370. If during spark test, a sample gives dull red sparks, it could be
a. Cast iron * b. Wrought iron
c. Mild steel d. Medium carbon steel
e. Non-ferrous material.

1371. In grey cast iron, free graphite is in the form of
a. Fine powder b. Needles
c. Flakes * d. Nodules
e. Crystals.

1372. Which allotropic form of iron does not have body centred cubic lattice ?
a. Alpha iron b. Beta iron
c. Gamma iron * d. Delta iron
e. All of the above.

1373. Chilling, heat treatment and alloy addition to cast iron generally
a. reduces machinability *
b. reduces wear resistance
d improves machinability
e. None of the above.

1374. The number of atoms per unit cell in BCC is
a. 9 * b. 3
c. 4 d. 6
e. 8.

1375. Manganese is added to steel primarily to increase
a. Tensile strength * b. Fatigue strength
c. Ductility d. Endurance limit
e. Malleability.

1376. The tensile strength of nodular iron may be of the order of
a. 100 kg/cm^2 b. 500 kg/cm^2
c. 1000 kg/cm^2 d. 2000 kg/cm^2
e. 4000 kg/cm^2.*

1377. Which of the following element does not impart hardness to steel ?
a. Copper * b. Nickel
c. Silicon d. Chromium
e. None of the above.

1378. Eutectoid steel has a structure of
a. Sorbite b. Nickel *
c. Martensite d. Bainite
e. A combination of all above.

1379. Hypoeutectoid steel has the structure of
a. Cementite b. Pearlite
c. Ferrite d. Ferrite & pearlite *
e. None of the above.

1380. The crystal structure of gamma iron is
a. BCC b. FCC *
c. HCP d. Cubic
e. Combination of all above.

1381. A hardness value of 1400 BHN can be expected in case of
   a. Cementite * b. Ferrite
   c. Pearlite d. All of the above
   e. None of the above.

1382. The percentage of carbon in cold rolled steel sheets is around
   a. 0.01 % b. 0.1 % *
   c. 0.8 % d. 1.1 %
   e. 2.1 %.

1383. Alpha brass is a (an)
   a. Intermediate phase
   b. Interstitial compound
   c. Substitutional solid solution *
   d. None of the above.

1384. Which of the following material is viscoelastic in properties ?
   a. Graphite b. Rubber *
   c. Glass d. Cork
   e. None of the above.

1385. Just as strong is opposite of weak likewise elastic is opposite of
   a. Hard b. Soft
   c. Rigid * d. Inelastic
   e. Ductile.

1386. Plasticisers are added to plastic compounds to
   a. Provide a protective layer
   b. Improve resistance to acids
   c. Improve resistance to alkalies
   d. Increase tensile strength
   e. Improve softness and flexibility.*

1387. The nature of atomic bond found in diamond is
   a. Ionic b. Covalent *
   c. Metallic d. Either of above
   e. None of the above.

1388. The crystal structure of most of the common metals is
   a. Hexagonal b. Cubic *
   c. Orthorhombic d. Any of the above
   e. None of the above.

1389. Monochromatic X-rays reflected from a calcite crystal (lattice constant a = 3Å) give rise to first order Bragg reflection at 6.7°. The wavelength of these X-rays will be
   a. 0.07 A b. 0.7 A *
   c. 7 A d. 70 A
   e. 170 A.

1390. Magnetism is non-linearly related to the applied field in case of
   a. Diamagnetic field b. Paramagnetic field
   c. Ferromagnetic field * d. All of the above
   e. None of above.

1391. The net magnetic moment is zero in case of
   a. Ferromagnetic materials
   b. Ferrimagnetic materials
   c. Anti-ferromagnetic materials *
   d. All of the above.
   e. None of the above.

1392. All of the following are magnetic materials EXCEPT:
   a. Nickel b. Cobalt
   c. Iron d. Zinc *
   e. Cast iron.

1393. Nickel is
   a. Ferromagnetic * b. Ferroelectric
   c. Dielectric d. Paramagnetic
   e. None of the above.

1394. In a diamagnetic material the effect of an applied magnetic field is that
   a. A net dipole moment is induced in the material
   b. There is a net reduction in flux density
   c. The induced magnetism is in opposition to applied field
   d. All of the above *
   e. None of the above.

1395. Ferrites are a sub-group of
   a. Ferromagnetic materials
   b. Ferrimagnetic materials *
   c. Diamagnetic material
   d. Paramagnetic materials
   e. None of the above.

1396. Above the curie temperature, a magnetic material becomes
   a. Diamagnetic b. Paramagnetic *
   c. Ferromagnetic d. Dielectric
   e. None of the above.

1397. In anti-ferromagnetic materials the spin moments associated with two sets of atoms are aligned
   a. Anti-parallel to each other *
   b. Parallel to each other
   c. Random to each other
   d. Anti-parallel but of unequal magnitudes
   e. None of the above.

1398. The electrical conductivity of ferrites is
   a. Less than that of ferromagnetic materials *
   b. Equal to that of ferromagnetic materials
   c. Greater than that of ferromagnetic materials
   d. Very high as compared to that of ferromagnetic materials
   e. Very low as compared to that of ferromagnetic materials.

1399. During dielectric heating, the heat is generated primarily due to
   a. Eddy currents * b. Stray magnetic fields
   c. High voltage
   d. High power consumption
   e. High flux density.

1400. High ductility wires are made on
a. Dead mild steel *
b. Medium carbon steel
c. High carbon steel
d. High power consumption
e. High flux density.

1401. The correct order of cooling media for decreasing cooling rate is
a. Air, water, oil, fused salt
b. Water, air, fused salt, oil
c. Oil, fused salt, air, water
d. Water, oil, fused salt, air.*

1402. Which of the following material is used for permanent magnets ?
a. Alnico * b. Delta metal
c. Elnivar d. Invar
e. Duralumin.

1403. The Miller indices for the face DCEF shown in Fig. are
a. 100 * b. 111
c. 101 d. 010
e. 011.

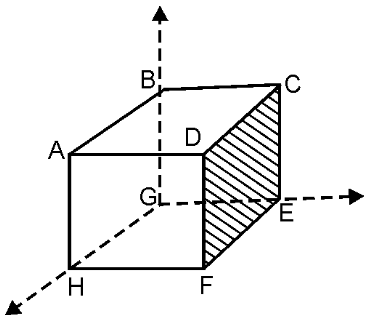


Fig.20.

1404. The Miller indices for the surface AFGD in Fig.21 are
a. 010 b. 011
c. 100 d. 111
e. 110.*

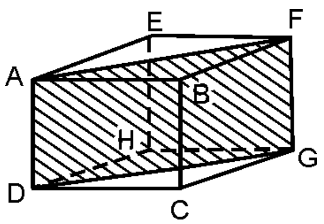


Fig. 21.

1405. The atomic packing factor for face centred cube is nearly
a. 0.52
b. 0.68
c. 0.74 *
d. 0.81
e. 0.91.

1406. Which of the following materials are usually most ductile ?
a. Hexagonal close-packed lattice
b. Face centred cubic lattice *
c. Body centred lattice
d. Amorphous
e. Non-metallic.

1407. In nodular iron, graphite is present in the form of
a. Flakes b. Needles
c. Powder d. Spheroids *
e. Prisms.

1408. Which of the following is closest to the purest form of iron
a. Wrought iron * b. Pig iron
c. Mild steel d. Grey cast iron
e. Nodular cast iron.

1409. The crystal structure of alpha iron is
a. BCC * b. FCC
c. HCP d. Cubic
e. None of the above.

1410. The highest rate of quenching is possible in
a. Cold furnace b. Hot furnace
c. Air d. Oil
e. Water.*

1411. Which of the following hardening process is generally used for non-ferrous materials ?
a. Cyaniding b. Flame hardening
c. Pack carburizing d. Age hardening *
e. Nitriding.

1412. Mild steel has the structure of
a. FCC b. BCC *
c. HCC d. Cubic
e. Orthorhombic.

1413. In grey cast iron, carbon is present in the form of
a. Cementite b. Flakes *
c. Powder d. Spheroids
e. None of the above.

1414. 'Killed' steel is
a. Steel which has been shaped on a power hammer
b. Steel with less than normal percentage of carbon
c. Steel with more than normal percentage of carbon
d. Steel that has lost its properties due to excessive alloying
e. That steel which is deoxidised in the ladle with silicon and aluminium.*

1415. The maximum percentage of carbon in ferrite is
a. 0.001 % b. 0.025 % *
c. 0.040 % d. 0.25 %
e. 0.125 %.

1416. The maximum percentage of carbon in austenite is
a. 2.7 % b. 2 %
c. 1.7 % * d. 0.7 %
e. 0.07 %.

1417. The depth of hardness in steel can be increased by the addition of
a. Vanadium b. Sulphur
c. Tungsten d. Nickel
e. Chromium.*

1418. Pure iron has the structure of
a. Pearlite b. Austenite
c. Ferrite * d. Pearlite and austenite
e. Pearlite, austenite and ferrite.

1419. The crystal structure of gamma iron is
a. Cubic b. BCC
c. FCC * d. HCP
e. Any of the above.

1420. Which of the following form of iron is produced as a result of annealing of white cast iron?
a. Malleable iron * b. Grey iron
c. Nodular iron d. Spheroidal iron
e. Wrought iron.

1421. The crystal structure of brass is
a. BCC b. FCC *
c. HCP d. Orthorhombic
e. Mixture of all above.

1422. Which of the following is not a constituent of Stellite?
a. Cobalt b. Tungsten
c. Ferrous * d. Chromium
e. All of the above.

1423. Which of the following material is generally not used as deoxidiser for producing killed steel ?
a. Copper * b. Ferro-silicon
c. Ferro-manganese d. Aluminium
e. All of the above.

1424. Machinability of metal depends on
a. Hardness
b. Hardness and tensile strength *
c. Brittleness
d. Brittleness and toughness
e. None of the above.

1425. Silicon when added to copper increases its
a. Machinability b. Brittleness
c. Malleability d. Hardness *
e. Electrical conductivity.

1426. Which of the following material is not used for cyaniding ?
a. Sodium carbonate
b. Sodium chloride c. Sodium hydroxide *
d. Sodium cyanide e. All of the above.

1427. The percentage of sulphur in steel can be reduced by adding
a. Manganese * b. Copper
c. Zinc d. Magnesium
e. Chromium.

1428. Which of the following material is added to cast iron to obtain nodular cast iron ?
a. Chromium b. Copper
c. Magnesium * d. Manganese
e. Molybdenum.

1429. Which of the following operation on grey cast iron will result in the production of white cast iron ?
a. Tumbling b. Tempering
c. Shot peening d. Rapid cooling
e. Rapid heating.*

1430. Nodular iron has low
a. Machinability b. Tensile strength
c. Fluidity d. Melting point.*

1431. Which of the following metal does not have face centred cubic structure ?
a. Copper b. Silver
c. Tin * d. Lead
e. Nickel.

1432. Which of the following metal has face centred cubic structure ?
a. Zinc b. Gold *
c. Magnesium d. Cadmium
e. Tin.

1433. Which of the following material has body centred cubic structure ?
a. Molybdenum * b. Cadmium
c. Glass d. Magnesium
e. Zinc.

1434. Which of the following material does not have body centred cubic structure ?
a. Vanadium b. Potassium
c. Lithium d. Zirconium *
e. Chromium.

1435. Which of the following element has hexagonal close packed structure ?
a. Aluminium b. Molybdenum
c. Cadmium * d. Chromium
e. Lead.

1436. Which of the following material does not have hexagonal close packed structure ?
a. Magnesium
b. Alpha iron *
c. Titanium
d. Zinc
e. Cadmium.

1437. Which of the following constituent will increase the hardness of steel ?
  a. Martensite * b. Pearlite
  c. Austenite d. Cementite
  e. All of the above.

1438. When steel is made from phosphatic iron, it is likely to be
  a. Malleable b. Ductile
  c. Hard d. Brittle *
  e. Tough.

1439. Steel recommended for induction hardening should have
  a. Fine grains *
  b. Coarse grains
  c. Low alloy content
  d. Rough surface
  e. Low electrical and thermal conductivity.

1440. The process for steel making being used at Rourkela steel plant is
  a. L-D process * b. Duplex process
  c. Bessemmer process d. Open hearth process
  e. Electric process.

1441. The process for steel making used at TISCO, Jamshedpur is
  a. L-D Process b. Duplex process *
  c. Electric process d. Bessemmer process
  e. Open hearth process.

1442. Electric process for steel making is used in which of the following steel plant ?
  a. Bhilai b. Bokaro
  c. Durgapur d. TISCO
  e. None of the above.*

1443. The hardness obtained by hardening process does not depend upon
  a. Carbon content b. Work size
  c. Atmospheric temperature *
  d. Quenching rate.

1444. Austenitic stainless steels contain chromium and nickel in amounts required to assure that even at room temperatures, the steels retain their crystalline structures, which are
  a. Face centred cubic *
  b. Diamond cubic
  c. Hexagonal closed -packed
  d. Partly amorphous.

1445. If the structure of a sample consists of pearlite, cementite and free carbon, the sample may be
  a. Cast iron * b. Alloy steel
  c. Dead mild steel d. Eutectoid steel
  e. None of the above.

1446. If the steel at room temperature is magnetic, the presence of which constituent can be ruled out ?
  a. Ferrite b. Pearlite
  c. Austenite * d. Cementite
  e. None of the above.

1447. The allotropic form of iron not having body centred cubic lattice is
  a. Alpha iron b. Beta iron
  c. Gamma iron d. Delta iron *
  e. All of the above.

1448. The operation that usually follows hardening is
  a. Annealing b. Normalising *
  c. Tempering d. Cyaniding
  e. Carburising.

1449. In a specimen of hardened steel, hard and soft spots indicate
  a. Free carbon
  b. Uneven heating *
  c. Non-uniform composition of steel
  d. Presence of pearlite
  e. Presence of cementite.

1450. If a medium carbon hardened steel shows pearlite structure it may be concluded that
  a. Steel contains impurities
  b. Steel has been slowly cooled in furnace *
  c. Steel has been quenched in oil
  d. Steel has been quenched in water.

1451. Which of the following structure is least hard ?
  a. Martensite b. Troosite
  c. Pearlite * d. Sorbite.

1452. The unit of diffusion coefficient is
  a. metre b. metre second
  c. metre second^{-1} d. metre^2 second^{-1} *
  e. metre^{-2} second $^{-1}$.

1453. If a sample of steel shows unsymmetrical deformation of a piece in quenching, the probable cause could be
  a. Excessive proportion of alloying elements
  b. Non-uniform heating or cooling *
  c. Impure quenching oil
  d. Low temperature during heating
  e. Low specific heat of quenching oil.

1454. Ferrite is
  a. Amorphous and brittle
  b. Soft and ductile *
  c. Hardenable under rapid cooling
  d. Present in abundance in high carbon steel.

1455. Which of the following affects the hardenability of steel ?
  a. Austenitic composition
  b. Austenitic grain size
  c. Amount, nature and distribution of undissolved or insoluble particles in austenite
  d. All of the above.*

1456. The depth of hardening is affected by
   a. Size of specimen
   b. Hardenability of steel
   c. Quenching medium
   d. All of the above.*

1457. Local hardening of steel can be done by all of the following EXCEPT :
   a. induction hardening
   b. flame hardening *
   c. stepped uniform heating
   d. resistance heating.

1458. Hardening by carburizing is limited to
   a. 0.05 mm b. 0.1 mm
   c. 2 mm * d. 5 mm.

1459. A steel piece after hardening is heated to 300ºC and then cooled in oil. The property imparted to the steel piece will be
   a. Softness b. Toughness *
   c. Hardness d. Annealing

1460. The minimum carbon percentage required in steel so that it may respond to hardening by heat treatment is
   a. 0.02 percent b. 0.08 percent
   c. 0.2 percent * d. 0.8 percent.

1461. The effect of austenitic grain size development during heat treatment is
   a. lower hardenability b. greater toughness *
   c. lower internal stress d. all of the above.

1462. During hardening soft spots can be avoided by
   a. using a more effective cooling medium
   b. protecting against decarburization in heating
   c. obtaining a more homogeneous structure employing annealing or normalising before hardening
   d. any of the above.*

1463. Insufficient hardness after tempering may be due to
   a. tempering temperature too low
   b. tempering temperature too high *
   c. oxidising atmosphere in the furnace
   d. any of the above.

1464. A steel specimen is heated to 730ºC and cooled at the slowest possible rate in the furnace. Which property will be imparted to the steel piece ?
   a. Hardness b. Softness *
   c. Toughness d. Tempering.

1465. Warping of articles during heat treatment may be due to
   a. non-uniform heating
   b. non-uniform cooling
   c. internal stresses in the article before heating.*

1466. If an article develops insufficient hardening after quenching it could be due to any of the following EXCEPT :
   a. Internal stresses in the article before heating *
   b. Hardening temperature too low
   c. Cooling rate too slow
   d. Holding Insufficient at the hardening temperature.

1467. If an article develops insufficient hardening after quenching, the defect can be corrected by
   a. removing scale from surface
   b. normalising or annealing followed by hardening *
   c. reheating the article in oxidizing atmosphere and quenching
   d. any of the above.

1468. During burning of grain boundaries
   a. regions enriched in carbon are formed in first state of burning
   b. non-oxidized cavities and blow hole are formed during second stage
   c. iron oxide inclusions are formed in third stage
   d. all of the above.*

1469. During heat treatment, deformation and volume changes can be minimised by
   a. slowly cooling in the martensitic range
   b. using surface hardening when possible
   c. using alloy steels least prone to such changes
   d. any of the above.*

1470. Quenching cracks during heat treatment can be minimised :
   a. by avoiding sharp projections and sudden transitions from thick to thin sections
   b. articles should be free from stresses before heat treatment
   c. heat to minimum stable temperature for hardening
   d. any of the above.*

1471. Formation of thick layer of scale on the surface of steel articles can be minimised by
   a. heating in furnaces with reducing, neutral or protective atmosphere
   b. heating in boxes with used carburising agent or cast iron chips
   c. heating in molten salt bath
   d. any of the above.*

1472. Which of the following furnace is used for steel only?
   a. Cupola
   b. Air furnace
   c. Open hearth furnace *
   d. Indirect arc furnace.

1473. During heat treatment the formation of thick layer of scale on the surface of steel articles is mainly due to
   a. excessive hardness b. oxidation *
   c. reduction d. coarse grain structure.

1474. During heat treatment quenching cracks occur due to
a. irregular martensitic transformation within the article *
b. oxidising atmosphere within the furnace
c. heating at higher temperatures for longer durations
d. all of the above.

1475. Which metal has the highest melting point ?
a. Antimony b. Chromium *
c. Gold d. Stainless steel.

1476. Which colour of heat represents the highest temperature ?
a. Blood red b. Salmon
c. Dry cherry d. White.*

1477. Which of the following furnace is used to convert liquid pig iron into steel ?
a. Cupola b. Open hearth furnace
c. Converter * d. Induction arc furnace.

1478. Which of the following can be used as fuel in open hearth furnace ?
a. Liquid fuels b. Coke oven gas
c. Producer gas d. Any of the above.*

1479. The degree of perfection used in instruments, the methods and the observations, is known as
a. Precision * b. Accuracy
c. Efficiency d. Least count
e. Error.

1480. The accuracy depends upon
a. Precision of instrument
b. Precision of method c. Good planning
d. All of the above * e. None of the above.

1481. A discrepancy is
a. The difference between a measurement and true value of the quantity measured
b. The difference between true value of the quantity and error
c. The difference between measured value and actual value
d. The difference between the measured values of the same quantity *
e. None of the above.

1482. If a measuring tape is too long as compared to standard, the error will be known as
a. Instrumental error * b. Personal error
c. Natural error d. Manufacturing error.
e. Superficial error.

1483. Natural error in measurement may be due to
a. Humidity b. Temperature
c. Wind d. Gravity
e. Any of the above *.

1484. The errors which form inexperience of the observer are known as
a. Training errors b. Handling errors
c. Personal errors d. Accidental errore
e. Mistakes.*

1485. If an error under the same size and sign, it is known as
a. Training errors b. Systematic errors
c. Cumulative error
d. Either of (a) and (b) above.
e. Either of (b) and (c) above.*

1486. The statement " The most probable value of an observed quantity available from a given set of observation is the one for which the sum of the square of errors is a minimum" is known as
a. Law of square probability
b. Pythogorus theorem
c. Principle of least squares *
d. Law of errors
e. Principle of square errors.

1487. The maximum allowable limit that a measurement may vary from the true value is called
a. Permissible error * b. Expected error
c. Range of error d. Least error
e. Safe error.

1488. The value of permissible error depends upon
a. The scale
b. The instrument available
c. Class of work
d. All of the above.*
e. None of the above.

1489. An error that under the same conditions will always be of the same size and sign is known as
a. Mistake * b. Accidental error
c. Cumulative error d. Systematic error
e. Detectable error.

1490. Invar, the least expensible steel alloys used for measuring tapes contains about 30% of
a. Nickel * b. Vanadium
c. Cobalt d. Aluminium
e. Copper.

1491. The minimum change in the measured variable which produces an effective response of the instrument is known as
a. Resolution sensitivity *
b. Accuracy b. Hysteresis
c. Precision d. Deviation.

1492. CB represents
a. Lag * b. Resolution
c. Mistake d. Sensitivity
e. Cumulative error.

1493. The largest range through which the measurable variable can change without the change being indicated by the indicator is known as
a. Probability error b. Time lag
c. Dead zone * d. Threshold sensitivity
e. None of the above.

1494. Which of the following could be the source of random error in and instrument ?
a. Friction in instrument movement
b. Backlash
c. Mechanical vibrations
d. Hysteresis in elastic members
e. Any of the above.*

1495. Which of the following standard can be used for defining length ?
a. Bar standard b. End standard
c. Light wave standard
d. Any of the above.* e. None of the above.

1496. The reliability of an instrument means
a. The maximum useful life of an instrument
b. The service of an instrument between two repairs
c. The range in which the characteristics of an instrument remain linear
d. The degree to which repeatability continues to remain within specified limits *
e. None of the above.

1497. The sensitivity accuracy of an instrument depends on
a. Frequency response
b. Amplitude distortion
c. Temperature variations *
d. Hysteresis
e. None of the above.

Questions 1498 to1501 refer to data given below :

A set of 10 independent measurement is given below :

1.570	1.580
1.597	1.564
1.591	1.586
1.562	1.550
1.577	1.575

1498. The arithmetic mean is
a. 1.5 b. 1.515
c. 1.5702 d. 1.5752 *
e. 1.5888.

1499. The average deviation is
a. 0.01068 * b. 0.10068
c. 1.06080 d. 1.1608
e. 1.0806.

1500. The standard deviation is
a. 0.0014 b. 0.01426 *
c. 0.012463 d. 0.013466
e. None of the above.

1501. The probable error of one reading will be
a. 0.0024 * b. 0.0240
c. 0.0420 d. 0.240
e. 0.480.

1502. A digital thermometer has 3½ digit display. The 1ºC range can be read upto
a. 1.000ºC b. 1.001ºC
c. 1.999ºC * d. 0.999ºC
e. None of the above.

1503. The accuracy of a 0-10 mV meter is ± 10 percent. A full scale reading of 10 mV may be due to a voltage of
a. 9mV b. 11mV
c. Either 9 mV or 10 mV d. Either 9 mV or 11 mV *
e. More than 11 mV.

1504. A 0 - 100ºC thermometer has accuracy of +2.5%. Its accuracy while reading 50 mA will be
a. +1.25 % b. - 1.25 %
c. ± 2.5 % d. ± 5 % *
e. ± 10 %.

1505. In a digital instrument "over ranging" means
a. Only three digits are switched on
b. All digits indicate reading of 8
c. Parameter being measured is varying constantly
d. Half digit is switched off
e. Half digit is switched on.*

1506. Mete accuracy is determined by
a. Full scale deflection *
b. Half scale deflection
c. One fourth scale deflection
d. Least reading possible on the scale
e. Thickness of the pointer.

1507. The static error band of an instrument does not include
a. Hysteresis in the instrument
b. Electrical draft *
c. Non-linearity
d. All of the above.
e. None of the above.

1508. A temperature sensitive transducer is subjected to a sudden temperature change. It takes 18 seconds for the transducer to reach equilibrium condition (five times constant). The time taken by the transducer to read half of the temperature difference will be nearly
a. 0.35 second b. 0.69 second
c. 0.99 second d. 1.38 second *
e. 3.92 second.

1509. A measuring system has an exponential response to a step input. The time constant of the system is 2 seconds. The time required to reach 50% of the final steady state reading will be
a. 0.69 second b. 1 second
c. 1.39 second * d. 1.99 second
e. 3.55 second.

1510. In the above case the time required to reach to 80% of the final steady state reading will be
a. 0.6 second b. 1.2 second
c. 1.8 second d. 2.4 second
e. 2.2 second.*

1511. Which of the following magnetic material has highest coercive force ?
a. Carbon steel * b. Cobalt steel
c. Alnico d. Alcomax.

1512. Which of the following magnetic material has highest coercive force ?
a. Carbon steel b. Dead mild steel
c. Tungsten steel d. Cobalt steel
e. Alcomax.*

1513. Manganin does not contain
a. Zinc * b. Copper
c. Manganese d. Nickel
e. All of the above.

1514. Constantan is an alloy of
a. Nickel and copper * b. Nickel and silver
c. Lead and zinc d. Aluminium and zinc
e. Aluminium and copper.

1515. 1 watt is the same as
a. 10^3 ergs/s b. 10^{10} ergs/s
c. 10^5 ergs/s d. 10^6 ergs/s
e. 10^7 ergs/s.*

1516. 1 Joule is equal to
a. 10^{12} ergs b. 10^{10} ergs
c. 10^9 ergs d. 10^7 ergs *
e. 10^5 ergs.

1517. Pico × tera =
a. 1 * b. 1000
c. 100,000 d. 1,000,000,000
e. 1,000,000,000,000.

1518. Under force-current analogy, displacement is considered as analogous to
a. Current b. Voltage
c. Induced emf d. Mutual inductance
e. Magnetic flux linkage.*

1519. Under force-voltage analogy, velocity is considered as analogous to
a. Resistance b. Current *
c. Magnetic flux d. Inductance
e. Charge.

1520. Under the voltage analogy, charge is considered analogous to
a. Force b. Mass
c. Momentum d. Velocity
e. Displacement.*

1521. Under force-voltage analogy, spring constant is considered analogous to
a. Reciprocal of resistance
b. Reciprocal of inductance *
c. Reciprocal of capacitance
d. Reciprocal of impedance
e. None of the above.

1522. Under force-current analogy, velocity is considered analogous to
a. Voltage * b. Inductance
c. Resistance d. Magnetic flux
e. None of the above.

1523. Under force-current analogy, mass is considered analogous to
a. Current
b. Capacitance *
c. Reciprocal of capacitance
d. Reciprocal of resistance
e. Resistance.

1524. Under force-current analogy, viscous friction coefficient is considered analogous to
a. Reciprocal of resistance *
b. Reciprocal of inductance
c. Reciprocal of capacitance
d. Reciprocal of current.

1525. Under force-current analogy, the reciprocal of inductance is considered analogous to
a. Mass b. Momentum
c. Displacement d. Spring constant *
e. Velocity.

1526. Under force voltage analogy, viscous friction coefficient is not considered analogous to
a. Charge b. Mutual inductance
c. Capacitance d. Resistance *
e. Current.

1527. Under force voltage analogy mass is considered analogous to
a. Resistance b. Inductance *
c. Capacitance d. Admittance
e. Current source.

Questions 1528 to 1530 refer to data given below :

A 3 ½ digital voltmeter has an accuracy specifications of ± 0.5 percent of reading ± 2 digits.

1528. What is the possible error, in volts, when the instrument is reading 5.00 V on its 10 V range ?
a. ±0.045 V b. ±0.45 V *
c. ±0.4 V d. ±4.05 V
e. None of the above.

1529. What is the possible error, in volts, when reading 0.10 V on the 10 V range ?
a. ±0.00205 b. ±0.0205 *
c. ±0.205 d. ±2.05
e. ±0.5.

1530. In the above problem what percentage of the reading is the possible error ?
a. 0.205% b. 2.05%
c. 2.5% d. 20.5% *
e. None of the above.

Questions 1531 to 1534 refer to data given below :

1531. A 4½ digit voltmeter is used for voltage measurement. Its resolution will be
a. 0.01% * b. 0.001%
c. 0.0001% d. 0.00001%
e. 1%.

1532. How would 12.9 V be displayed on 10 V range ?
a. 12.9 b. 12.90
c. 12.900 * d. 12.9000
e. 12.90000.

1533. How would 0.3564 be displayed on 10 V range ?
a. 3564 b. 0.3564 *
c. 0.3564 d. 0.356400
e. 0.3564000.

1534. A three digit 0-1 V digital voltmeter will have a resolution of
a. 1 A b. ½V
c. 0.1 V d. 1 mV *
e. 1μV.

1535. A three and a half digit 0-1 V digital voltmeter will have a resolution of a
a. 0.1 V b. 1 V
c. $\frac{1}{3}$V d. $\frac{1}{3.5}$
e. 1 mV.*

1536. Which of the following strain gauge material has the highest value of gauge factor ?
a. Manganin b. Nichrome
c. Constantan d. Soft iron.*

1537. The gauge factor for doped crystal is in the range
a. 0.5 to 1 b. 1 to 2
c. 2 to 20 d. 20 to 50
e. 100 to 5000.*

1538. A strain gauge material should have low
a. Gauge factor
b. Sensitivity
c. Resistance temperature coefficient *
d. All of the above.

1539. A high gauge factor for a strain gauge results in
a. Reduced hysteresis effect
b. Highest sensitivity *
c. Linear response to measurements
d. All of the above.

1540. The resistance of a strain gauge should be high
a. To increase sensitivity
b. To reduce hysteresis effect *
c. To swamp out the effects of variations of resistance in other parts of the bridge
d. None of the above.

1541. The carrier material used with strain gauges at room temperature is
a. Impregnated paper * b. Rubber
c. Epoxy d. Iron cement

1542. Although semi-conductor strain gauges have high gauge factor still these are not preferred due to
a. Non-linearity
b. Non-linearity and sensitivity to temperature fluctuations *
c. Small size and high cost
d. Difficulties in connections and high cost of auxiliary equipment.

1543. In case of strain gauges, the gauge factor k is related to Poisson's ration μ by the relation
a. $\mu = \frac{k+1}{2}$ b. $\mu = \frac{k-1}{2}$ *
c. $k = 1 - \mu$ d. $k = 1 + 2\mu$
e. None of the above.

1544. Spot the odd one out
a. Vaccum gauge
b. Compound pressure gauge
c. Pirani gauge d. Strain gauge.*

1545. A strain gauge with high sensitivity and high gauge factor is
a. Nichrome transducer
b. Semi-conductor strain gauge transducer *
c. Platinum-tungsten alloy transducer
d. Stability and dynaloy strain gauge transducer.

1546. For bridge circuit of strain gauge which source of power will be ideal ?
a. Low voltage of source
b. High voltage dc source
c. Low frequency ac source
d. High frequency ac source.*

1547. Which of the following torque transducer needs battery of rectified ac source for its operation ?
a. Strain gauge
b. Differential transformer
c. Variable permeability transducer
d. Optical transducer
e. All of the above.*

1548. Rosette strain gauges are used for measurement of strain in
a. Horizontal direction only
b. Vertical direction only
c. Complex parts.*

1549. Which of the following is an electric tachometer ?
a. Stroboscopic tachometer
b. Eddy current tachometer
c. Drag type tachometer
d. Ignition type tachometer
e. All of the above.*

1550. A copper-constantan thermocouple can be used for the range of temperature from
a. 100°C to 250°C
b. 0°C to 250°C
c. -50°C to 300°C
d. -175°C to 350°C *
e. -212°C to 1000°C.

1551. An iron-constantan thermocouple can be used for the temperature
a. 0°C to 600°C b. -175°C to 900°C *
c. -250°C to 1500°C d. -373°C to 1800°C
e. 0°C to 2500°C.

1552. The standard oxygen point temperature is
a. 182.97°C b. 0°C
c. 163.45°C d. -182.27°C *
e. -213.99°C.

1553. The standard sulphur point temperature is
a. 100°C b. 212°C
c. 444.60°C * d. 666.80°C
e. 999.99°C.

1554. The standard silver point temperature is
a. 666°C b. 788.90°C
c. 887.95°C d. 860.5°C *
e. 1155.5°C.

1555. The standard gold point temperature is
a. 1000°C b. 1063°C *
c. 1360°C d. 1630°C
e. 1963°C.

1556. Which of the following temperature is highest ?
a. Melting point of gold
b. Melting point of steel
c. Melting point of tungsten
d. Melting point of zinc *
e. Melting point of lead.

1557. The melting point of tungsten is around
a. 1256°C b. 1156°C
c. 2800°C d. 3400°C *
e. 4400°C.

1558. The temperature of freezing mercury is
a. 0°C b. -39°C *
c. -69°C d. -169°C
e. -225°C.

1559. Which of the following is a non-contact type thermometer ?
a. Alcohol thermometer
b. Thermocouple
c. Bimetal strip thermometer
d. Vapour pressure thermometer
e. Optical pyrometer.*

1560. Which of the following is not a non-contact type thermometer ?
a. Disappearing filament type pyrometer
b. Total intensity radio meters
c. Photoelectric tube pyrometers
d. Suction pyrometer *
e. Colour pyrometer.

1561. Which of the following instrument is suitable for measuring the temperature of a red hot moving material like molten steel or molten cast iron ?
a. Optical pyrometer *
b. Bimetallic thermometer
c. Thermocouple
d. Resistance thermometer
e. Any of the above.

1562. Which of the following instrument is suitable for measuring the temperature of a red hot moving material like molten steel of molten cast iron ?
a. Gas thermometer b. Thermistor
c. Thermocouple d. Radiation pyrometer *
e. All of the above.

1563. Contraction or expansion due to changes in temperature can be measured by
a. Dilatometer * b. Fathometer
c. Tellurometer d. Optical pyrometer
e. Thermocouple.

1564. The least count of a vernier caliper used in industries is generally
a. 0.001 mm b. 1 mm
c. 0.02 mm * d. none of the above.

1565. The amount of moisture in air is measured by
a. Single psychrometer *
b. Orsat apparatus
c. Mass spectrometer
d. Photo conductive cell
e. Thermistor.

1566. Which of the following device is primarily used to measure pressure ?
a. Bourdon tube * b. Kundts tube
c. Hygrometer d. Rotameter
e. All of the above.

1567. The joints of a phosphor-bronze Bourdon tubes are
a. Soldered * b. Brazed
c. Screwed d. Welded
e. Jointed by adhesives.

1568. Phosphor bronze Bourdon tube can be used of pressures upto
a. 5 kg/cm^2 b. 10 kg/cm^2
c. 15 kg/cm^2 d. 70 kg/cm^2 *
e. 170 kg/cm^2.

1569. Which of the following Bourdon tube material can be used for very high pressures ?
a. Phosphor bronze b. Stainless steel
c. Alloy steel * d. Beryllium copper
e. K-monel.

1570. Stainless steel Bourdon tube pressure gauge joints are usually
a. Soldered b. Brazed
c. Welded * d. Screwed
e. Adhesive jointed.

1571. Nickel is the major constituent of which the following pressure gauge Bourdon tube material
a. Phosphor bronze b. Beryllium copper
c. Alloy steel d. 'K' monel *
e. Stainless steel.

1572. Which of the following phosphor bronze material is usually brazed ?
a. Phosphor bronze b. Beryllium copper *
c. Alloy steel d. K -monel
e. Stainless steel.

1573. Which of the following is an direct method of pressure measurement ?
a. Mcleod gauge
b. Thermal conductivity gauge
c. Ionisation gauge
d. Radioactive vacuum gauge
e. All of the above.*

1574. Which of the following is an indirect pressure measuring device ?
a. Bourdon tube b. Flat diaphragm
c. Ionisation gauge * d. Manometer
e. Capsules.

1575. In measurements using two strain gauges, the purpose of dummy strain gauge is
a. To nullify the errors due to temperature *
b. Improve stability of the measuring system
c. Measure lateral strain
d. Increase the sensitivity of measuring system.

1576. A 4½ digital multimeter can have maximum reading of
a. 9999 b. 1000
c. 19999 * d. 99999
e. 10000.

1577. A hot wire anemometer is used to measure
a. Pressure of gases
b. Liquid discharges
c. Very low pressures
d. Gas velocities *
e. Diameter of fine particles.

1578. Which of the following device can be used to measure blow of air around an aeroplane ?
a. Venturimeter b. Rotameter
c. Orifice d. Anemometer *
d. Manometer.

1579. Which of the following material is used for photoconductive cells
a. Selenium * b. Mica
c. Thorium d. Tungsten
e. Barium sulphate.

1580. A piezoelectric crystal can be used to measure
a. Temperature b. Velocity
c. Acceleration * d. Flow
e. All of the above.

1581. A piezometer is used to measure
a. Very low pressures *
b. Pressure differential
c. Atmospheric pressure
d. High pressures
e. Pressures above and below atmospheric pressure.

1582. Which of the following is not a piezoelectric material ?
a. Quarz
b. Sodium chloride *
c. Ammonium dihydrogen phosphate
e. All of the above.

1583. Which of the following statement is wrong for thermocouple measuring instruments ?
a. They read average values
b. They read rms values
c. They cannot take overheads
d. When calibrated on dc they cannot be used for ac signals *
e. Their calibration dies not change with time or temperature.

1584. The direction of current in case of antimony bismuth thermocouple will be
a. From antimony to bismuth at the cold junction *
b. From antimony at hot junction
c. From bismuth to antimony at cold junction
d. Any of the above.
e. None of the above.

1585. Which of the following is generally not used as a thermocouple material ?
a. Platinum - Rhodium b. Chromel - Alumel
c. Gold - Silver * d. Chromel - Copper
e. None of the above.

1586. Which of the following thermocouple can be used for temperatures above 1000°C
a. Platinum - Rhodium *
b. Chromel - Alumel
c. High pressure Chromel - Copper
d. Any of the above.
e. None of the above.

1587. The display of a digital numerical read out instrument is achieved by
a. Light emitting diodes
b. Light dependent resistors
c. Photo tune *
d. Ionization of gases
e. Heated filaments.

1588. Which of the following device can be used to give an indication for temperature changes ?
a. Bourden gauge b. Thermistor
c. Thermocouple * d. Transistor
e. LED.

1589. Thermocouple used in radio micrometer and thermo-galvanometer is
a. Antimony - bismuth couple *
b. Copper constantan couple
c. Copper iron couple
d. Iron -copper couple
e. None of the above.

1590. Thermocouples are generally used for temperature measurements upto
a. 250°C b. 500°C
c. 1000°C d. 1600°C *
e. 2600°C.

1591. The function of the reference electrode in a pH meter is to
a. Measure average pH value
b. Produce a constant voltage *
c. Provide temperature compensation
d. Produce a constant current
e. None of the above.

1592. Which of the following will be the most alkaline solution ?
a. pH 1 b. pH 4
c. pH 7 d. pH 10
e. pH 14.*

1593. The pH value of the pure water could be
a. 0 b. 1
c. 7 * d. 10
e. 14.

1594. Platinum is used in resistance thermometers because of
a. Low cost
b. Low cost and high stability
c. Low cost, high stability and wide operating range*
d. None of the above.

1595. Which of the following has the number of significant figures other than 3 ?
a. 542 A b. 1.65 V
c. 0.346 KΩ * d. 4×10^2.

1596. An electrometer is used for the measurement of
a. Voltages
b. Currents
c. Both (a) and (b) above.*
d. None of the above.

1597. Thermistors have
a. Low and positive temperature coefficient
b. Low and negative temperature coefficient
c. High and negative temperature coefficient *
d. Zero temperature coefficient.

1598. A hydrometer can be used to measure
a. Relative humidity of air
b. Conductivity of gases
c. Temperature coefficient of liquids
d. Specific gravity of liquids *
e. Specific gravity of solids.

1599. A pitot tube converts
a. Pressure head into velocity head
b. Velocity head into pressure head
c. Pressure head into temperature rise
d. Velocity head into temperature rise
e. None of the above.*

1600. A LVDT has
a. One primary coil and two secondary coils
b. Two primary coils and one secondary coil *
c. One primary coil and one secondary coil
d. Two primary coils and tow secondary coils.

1601. The 'dead time' of the instrument is
a. The time required by an instrument for initial warming up
b. The time required by an instrument to begin to respond to a change in the measured value
c. The largest change of input quantity for which there is no output of the instrument *
d. None of the above.

1602. Accelerometer is the transducer for
a. Vibration b. Shock *
c. Absolute motion d. All of the above
e. None of the above.

1603. A flow measuring system with a square root extractor usually has
a. Linear scale
b. No-linear scale
c. Inverse square law curve
d. Mass flow rate scale *
e. None of the above.

1604. A right balance meter cannot measure
a. Pressure * b. Differential pressure
c. Flow d. Mass flow rate
e. All of the above.

1605. In the process of manufacture of copper sheets, the thickness of the sheet is to be continuously monitored. Which transducer will be most suitable for this purpose ?
a. LVDT b. Strain gauge
c. Photo cell d. Any of the above.*
e. None of the above.

1606. In a load cell, strain gauge acts as a
a. Protective device * b. Comparator
c. Primary transducer d. Secondary transducer
e. None of the above.

1607. The duty cycle of a pulse of width 2 micro sec and repetition frequency 4 kHz is
a. 0.5 b. 0.05
c. 0.008 d. 0.0006 *
e. 0.00008.

1608. Metres A and B require 50 mA and 30 mA respectively to give full scale deflection. It can be concluded that
a. A is more sensitive as compared to B
b. B is more sensitive as compared to B
c. A has wider range than B *
d. B has better damping as compared to A
e. None of the above.

1609. A thermometer is calibrated 150°C to 200°C. The accuracy is specified within ± 0.25 percent. The maximum static error will be
a. ±0.25°C b. 0.5°C *
c. ±0.125°C d. +1°C
e. -1°C.

1610. A set of independent current measurements were recorded as 10.03, 10.10, 10.11 and 10.8. The range of error will be
a. 10.08 b. 10.07
c. ±0.03 * d. ±0.04
e. ±0.05.

1611. A hot wire anemometer is a variable
a. Inductance transducer
b. Resistance transducer
c. Capacitance transducer
d. Current transducer *
e. Frequency transducer.

1612. The electrical resistance of a wire is
a. Directly proportional to diameter and inversely proportional to length
b. Directly proportional to length and inversely proportional to length and diameter *
c. Directly proportional to length and diameter
d. Inversely proportional to resistance and length
e. None of the above.

1613. The advantage of digital instruments is
a. No observation error *
b. Faster reading
c. Output can be fed to a memory circuit
d. Better accuracy
e. All of the above.

1614. To measure the speed of a shaft without physical contact the method used is
a. Digital method
b. Variable reluctance tachometer
c. Stroboscope *
d. Any of the above

1615. A synchro is
a. A variable reluctance transducer
b. A parabolic transducer
c. An angular position transducer
d. A synchronizing transducer *
e. Any of the above.

1616. The material used in the construction of a thermistor is
a. Nickel oxide b. Iron oxide
c. Nickel * d. none of the above.

1617. The carrier material used with strain gages at room temperature is
a. impregnated paper * b. bakelite
c. epoxy d. none of the above

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1618. LVDT converts
a. linear displacement into electrical signal *
b. pressure into electrical output
c. strain into electrical output
d. none of the above.

1619. The main advantage of a CRO is
a. it is a voltage sensitive instrument *
b. an inertialess beam of electrons acting as a pointer
c. a fluorescent screen acts as scale
d. none of the above.

1620. In a CRO, output from which type of oscillator is applied to the horizontal deflection plate
a. square wave oscillator
b. sinusoidal wave oscillator *
c. sawtooth wave oscillator
d. None of the above.

1621. Main advantage of electrical measuring system over mechanical system is
a. mass-inertia effects are negligible
b. minimum effects of friction
c. remote indication is possible *
d. none of the above.

1622. A steel scale is slightly shorter when compared with a standard scale. This type of error is known as
a. natural error b. systematic error *
c. instrumental error d. none of the above.

1623. Which of the following material has minimum gauge factor
a. Monel b. Manganin *
c. Constantan d. none of the above.

1624. Under the conditions when the depth of water is too much, to make a continuous record of the depth of water below a boat or ship, the instrument generally used is
a. sound box b. fathometer *
c. dB meter d. none of the above.

1625. The degree of perfection used in instruments, techniques are observations is known as
a. Accuracy b. Precision *
c. Least Count d. none of the above.

1626. The maximum allowable limit that a measurement may vary from the true value is known as
a. expected error b. permissible error *
c. Range of error d. none of the above.

1627. Venturi tubes are generally made of
a. stainless steel b. aluminium
c. cast iron d. phosphor bronze.*

1628. Temperature of a hot moving body can be measured by
a. a radiation pyrometer
b. an optical pyrometer *
c. a resistance thermometer
d. none of the above.

1629. Which of the following is an indirect method of pressure measurement
a. McLeod gauge
b. Thermal conductivity gauge
c. Diaphragm
d. All of the above.*

1630. A transducer which converters an input physical quantity into electrical output in the form of pulse is known as
a. primary transducer
b. analogous transducer
c. digital transducer *
d. None of the above.

1631. A measure of the system's ability to handle transients is known as
a. Amplitude response
b. Rise time *
c. Phase response
d. All of the above.

1632. Pascal is the unit of
a. force b. torque
c. energy d. none of the above.*

1633. In case of obstruction meters used for flow measurement, pressure recovery is maximum in the case of
a. venturi * b. flow nozzle
c. orifice d. none of the above.

1634. The statement "the most probable value of an observed quantity available from a given lot of observations is the one for which the sum of the square of error is minimum" is known as law of
a. squared errors b. Pythagorous theorem
c. least squares * d. None of the above.

1635. Which of the following strain sensing elements has the highest value of gauge factor
a. Advance b. Nichrome
c. Manganin d. Soft iron.*

1636. Basically D'Arsonwal movement is
a. voltage sensitive b. current sensitive *
c. power sensitive d. none of the above

1637. Which of the following transducers is preferred for measurements involving sound
a. thermocouple
b. Kundt's tube
c. piezoelectric pick up *
d. none of the above.

1638. Which of the following materials has minimum temperature coefficient of resistance
a. Constantan * b. Isoelastic
c. Nichrome d. none of the above.

1639. A simple ac amplifier may be used to amplify dc input through use of an additional circuit component known as
a. tuned amplifier b. carrier
c. chopper * d. none of the above.

1640. One of more electronic tubes are used in the circuitry of a VTVM for
a. amplification
b. rectification
c. both for amplification and rectification *
d. none of the above.

1641. Which of the following is the area meter ?
a. venturimeter b. orifice meter
c. rotameter * d. none of the above.

1642. Spot the odd one out
a. Vacuum gauge b. Pirani gauge
c. Strain gauge * d. none of the above.

1643. A strain gauge material should have low
a. gauge factor b. strain sensitivity
c. resistance temperature coefficient *
d. none of the above.

1644. Which of the following temperature is highest
   a. melting point of gold
   b. melting point of silver
   c. melting point of steel
   d. none of the above.*

1645. The adhesion between the surface of property wrung gang blocks is of the order of
   a. 0 - 5 atmospheres
   b. 5 - 10 atmospheres
   c . 20 - 30 atmospheres *
   d. none of the above.

1646. A thermistor is basically an instrument for the measurement of
   a. pressure b. flow
   c. speed d. temperature *.

1647. In a thermocouple, the potential between the two junctions is due to the temperature gradient along the conductors in the circuit. This effect is named as
   a. Peltier's effect b. Thomson's effect *
   c. Seebeck effect d. none of the above.

1648. McLeod gauge is used to measure
   a. pressure * b. vacuum
   c. flow rate d. none of the above.

1649. Which of the following material has maximum temperature coefficient of resistance
   a. Nichrome V b. Isoelastic
   c. Manganin d. Monel.*

1650. Which of the following materials has maximum resistivity
   a. Nichrome b. Isoelastic *
   c. Karma d. none of the above.

1651. Elastic members such as Bourdon tube are used to
   a. change force into velocity
   b. change force into displacement *
   c. change force into stress
   d. none of the above.

1652. Loading error in a system can be classified as
   a. systematic error *
   b. error of judgement
   c. illegitimate error
   d. none of the above.

1653. A hot wire anemometer is used to measure
   a. pressure of liquids
   b. very low pressure
   c. gas velocities *
   d. none of the above

1654. A polarograph is used for the analysis of
   a. solids * b. liquids
   c. gases d. none of the above.

1655. Freezing point of mercury is
   a. -98.87ºC b. -48.80ºC
   c. -38.87ºC * d. none of the above.

1656. The fine wire of which material is most commonly used for resistance thermometer
   a. Stainless steel b. Aluminium
   c. Nickel * d. none of the above.

1657. Surface plates made of granite possess property
   a. are free from residual stresses
   b. there is less tendency for granite to creep
   c. granite does not corrode
   d. All of the above.*

1658. Natural error in measurements is due to variation in
   a. wind pressure b. humidity
   c. temperature d. any of the above.*

1659. The most sensitive thermocouple out of the following is
   a. copper - constantan
   b. chromel - constantan *
   c. iron - constantan
   d. none of the above.

1660. Synchronization in a CRO means
   a. holding a pattern on the screens without creep
   b. continuously monitoring the trace
   c. adjusting sweep frequency
   d. All of the above.*

1661. Piezoelectric crystal possesses the ability to convert
   a. electrical energy into mechanical energy
   b. strain energy into electrical energy
   c. mechanical energy into electrical energy
   d. All of the above.*

1662. Positive displacement flow meters are
   a. variable area flow meter
   b. differential pressure flow meter
   c. quantity flow meter *
   d. none of the above.

1663. A rotameter is used to measure
   a. velocity of liquids *
   b. pressure of gases
   c. specific gravity of liquids
   d. none of the above.

1664. Decibels are basically measures of
   a. power gain * b. voltage gain
   c. current gain d. none of the above.

1665. Which of the following materials has maximum gauge factor
   a. Nichrome b. Isoelastic *
   c. Karma d. none of the above

1666. Odometer is used to measure
 a. threshold odours of gases
 b. composition of gases
 c. distances *
 d. none of the above.

1667. Range of temperature measurement of a resistance thermometer is
 a. -50^{o}F to 200^{o}F
 b. -100^{o}F to 400^{o}F
 c. -200^{o}F to 800^{o}F
 d. -400^{o}F to 1800^{o}F.*

1668. Accuracy of measurements depends upon
 a. precision of technique
 b. precision of instruments employed
 c. good planning of instruments
 d. All of the above.*

■■■

CHAPTER - 107
SELECTION OF MATERIAL

1. Propeller blades are manufactured from either
   a. aluminium alloy b. wood
   c. steel d. all above *

2. Which of the following is used under experimental stage ?
   a. aluminium alloy b. steel
   c. wood d. magnesium alloy *

3. Propeller hubs are usually manufactured from
   a. chrome molybelenum steel
   b. chrome vanadium steel *
   c. chrome nickel steel
   d. all the above

4. Engine cowling is made from
   a. magnesium alloy b. aluminium alloy *
   c. forged steel d. cast iron

5. Which of the following is an excellent material for cowling ?
   a. 24 ST b. alclad 24 ST
   c. 61 SW * d. 24 SO

6. Which of the following has good fatigue & tensile strength ?
   a. 24 ST * b. 61 SW
   c. 24 SO d. none

7. Exhaust stacks are manufactured from
   a. 18 - 8 corrosion resistance
   b. inconnel
   c. carbon steel
   d. all *

8. Exhaust collector of small commercial planes, that do not use high octane gasoline, are manufactured from
   a. mild carbon steel
   b. chrome- molybdenum
   c. both a. & b. *
   d. 18 - 8 corrosion resistance steel

9. Which of the following is used for engine mounts ?
   a. chrome vanadium steel
   b. chrome uranium steel
   c. chrome aluminium steel
   d. chrome molybdenum steel *

10. Which of the following is most customary for joining of engine mounts ?
    a. welding * b. bolting
    c. riverting d. none

11. Firewall is usually constructed of
    a. magnesium alloy b. aluminum alloy *
    c. chromium alloy d. none

12. Oil tanks are usually constructed of
    a. magnesium alloy b. aluminium alloy
    c. aluminium d. any of the above *

13. Oil lines are usually manufactured from
    a. aluminium alloy b. copper
    c. copper silicon d. all of the above *

14. Push pull rods are manufactured of
    a. chrome molybelenum
    b. mild carbon steel
    c. both a. & b. *
    d. chrome vanadium

15. Most landing gears are made of
    a. chrome vanadium alloys
    b. chrome aluminium alloys
    c. chrome molybelenum alloys *
    d. all

16. Aluminium alloy monocoque construction are used for
    a. Landing gear b. fuel lines
    c. fuse lage * d. none

17. Subassemblies of welded tensile strength of steel landing gears are usually heat treated to
    a. 150000 p.s.i b. 180000 p.s.i
    c. either a. or b. * d. none

18. Wing ribe are made of
    a. wood b. aluminium alloy
    c. carbon steel d. all *

19. Which of the following is manufactured from Douglus fir ?
    a. wing covering b. wing tip bow
    c. wing beams * d. wing ribs

20. Aluminium alloy sheet backed by stiffeners used for the construction of
    a. wing ribs b. wing tip bow
    c. wing flaps * d. wing shield

21. High strength aluminium alloys are used for manufacturing of
    a. wing supporting b. wing fittings *
    c. ailerons d. wing flaps

22. Which of the following is not a transparent plastic ?
    a. pyralin b. plexiglas
    c. lucite d. all *

23. Windsheild frame are made from
    a. light steel b. aluminium steel
    c. inconel d. all *

24. Which of the following are used to manufacture instrument tubes
    a. 5250 b. 25
    c. both aluminium alloys * d. none

25. Seats are usually made from
    a. aluminium alloy b. magnesium alloy
    c. either a. or b. * d. none

26. Flooring is fabricated from
    a. plywood b. aluminium alloy
    c. either a. or b. * d. none

27. Which of the following aluminium alloy is frequently used for rudder pedals ?
    a. 17 ST b. 24 ST
    c. 195 ST * d. all

28. When it is necessary to position a bolt in place by tack welding the head , then the material used for manufacturing of bolt is
    a. nickel steel
    b. aluminium alloy
    c. chrome molybelenum steel *
    d. chrome vanadium steel

29. Larger coil springs used for engine valve & landing gear oleos are manufactured from
    a. chrome aluminium
    b. chrome molybelenum steel
    c. chrome vanadium steel *
    d. chrome nickel

30. Flat springs are made from
    a. chrome aluminium
    b. chrome molybelenum steel
    c. speed steel *
    d. chrome nickel

31. Steel rivets are used for
    a. heavily loaded structure assemblies *
    b. lightly loaded structure assemblies
    c. either a. & b.
    d. none

32. Which of the following rivets is seldom used, because of its tendency to crack ?
    a. 17 ST b. 24 ST *
    c. A17S d. none

33. Formica or backelite are used to manufacture
    a. seats b. flooring *
    c. controld d. rivets

34. Wing tip bows are generally manufactured from
    a. chrome molybdenum b. mild steel tube
    c. aluminium alloy d. either of above *

35. Copper, copper sillicon alloys are generally used for manufacturing of
    a. oil lines * b. engine control
    c. hulls & floats d. wings

36. Which of the following is subjected to reversal of stress ?
    a. tail wheel structure b. bushing *
    c. bearing d. bolts

37. For normal loading joints, which of the following is most prefered ?
    a. 17ST aluminium alloy *
    b. 24ST aluminum alloy
    c. steel riverts
    d. all

38. Aluminum alloy forgings are used for
    a. tail wheel structure * b. bushing
    c. bearing d. bolts

39. Bush is manufactured by heating chrome molybdenum to the strength of
    a. 125000p.s.i b. 150000 p.s.i
    c. either a. or b. * d. none

40. Standard A bolts, are heat treated to, the strength, maximum of
    a. 150000 p.s.i b. 125000 p.s.i
    c. 200000 p.s.i * d. 250000 p.s.i

■■■

CHAPTER - 108
PAINTS, COATS AND FINISHES

1. Which of the following is true about the paints
   a. it is a fluid with viscosity, drying time and flowing properties
   b. it consists of a vehicle or a binder
   c. it consists of a solvent or thinner and drier
   d. all of the above.*

2. Paints are used mostly, because of
   a. to protect against corrosion
   b. to protect against weather
   c. for aesthetics
   d. all the above *

3. The paints which dry essentially by solvent evaporation are called
   a. oxidation drying paints
   b. reduction drying paints
   c. solvent evaporation drying paints *
   d. all the above.

4. The paints based on cellulose derivatives or nitrocellulose are called
   a. Shellac b. Lacquers *
   c. Thinners d. Pigments.

5. Paints derived from acrylic and Vinyl resins require -------------- as a solvent
   a. alcohol b. cellulose
   c. ketones * d. bitumens.

6. The paints that dry by oxidation are called
   a. oxidation paints * b. reduction paints
   c. shellac paints d. pigments.

7. ---------------- are most commonly used asexterior house paints
   a. acrylic emulsions * b. lacquers
   c. shellacs d. pigments.

8. Architectural paints are
   a. solvent thinned b. water thinned
   c. any of the above * d. none of the above.

9. Acrylics can be made water soluble by attaching
   a. carboxyl group b. hydroxyl group
   c. amide group d. all the above *

10. Which of the following is true for water borne paints
    a. highly flammable
    b. highly toxic
    c. high mechanical stability *
    d. all the above.

11. Commercial finishes include
    a. air drying materials *
    b. baking cured materials
    c. any of the above
    d. none of the above.

12. Lacquers, varnishes and shellac are
    a. air drying finishes * b. baking finishes
    c. non toxic d. none of these.

13. The disadvantages of water borne paints
    a. they require a longer flash tunnel before curing
    b. coatings are more susceptible to dirt pickup
    c. proper temperature control is required
    d. all of the above *

14. The marking of centrelines on highways require
    a. air drying finisher *
    b. baking finsher
    c. solvent based finisher
    d. none of these.

15. When extreme hardness, chemical resistance and colour retention are required ---------------- is used
    a. air drying finish
    b. baking finish *
    c. solvent based finish
    d. none of these.

16. In automobile finishing ------------- is used
    a. shellac b. baked acrylic resins *
    c. lacquers d. layers.

17. Generally industrial coatings have
    a. 1 layer b. 3 layers *
    c. 5 layers d. 7 layers.

18. The primer coating is applied
    a. to make the surface smooth
    b. to dry the surfaces prepared by abrasive blasting *
    c. to increase the colour contrast
    d. all the above.

19. Most conventional systems include
    a. one prime coat and two finished coat *
    b. one finished and one prime coat
    c. two finished and two prime coat
    d. none of the above.

20. The function of the top coat or surface coat is
    a. to protect the primer
    b. to add colour and appearance
    c. to add to the cost
    d. only a. and b. *

21. Which of the following should be the property of top coating
 a. they should be impervious to moistures, salts and chemicals
 b. strong and resistant to mechanical damage
 c. adequate colour and gloss retention
 d. all the above *

22. Corossion process is
 a. aqueous b. non aqueous
 c. any of a. and b. * d. none of these.

23. Aqueous corrosion process is at
 a. low temperatures * b. high temperatures
 c. all temperatures d. none of these.

24. Non aqueous corrosion process is at
 a. low temperatures b. high temperatures *
 c. all temperatures d. none of these.

25. The reaction during corrosion is generally
 a. oxidation * b. reduction
 c. neutralization d. none of these.

26. The oxidation resistance in nickel and cobalt base super alloys is improved by using
 a. Chromia * b. Shellac
 c. Pigments d. Silica.

27. Which of the following is false for Benzene as a solvent
 a. it is colourless
 b. it is highly flammable
 c. it has very high evaporation rate
 d. none of the above. *

28. The main use of Benzene as solvent is
 a. as paint and varnish remover
 b. used for gravure lacquers
 c. both *
 d. none.

29. The boiling point of Benzene is
 a. 20° - 30°C b. 30° - 50°C
 c. 60° - 85°C * d. 90 - 105°C.

30. Lacquer dilutants are
 a. pure and colourless *
 b. hazardous
 c. less solvent for many synthetic and natural resins
 d. all the above.

31. The use of 'Lacquer dilutants' is in
 a. Phenolic resins and enamels
 b. Modified solvents for cellulose
 c. In stains etc.
 d. All the above *

32. The boiling range of lacquer dilutants is
 a. 20 - 30°C b. 35 - 50°C
 c. 55 - 70°C d. 85 - 120°C *

33. Which of the following is the property of xylene as solvent
 a. it is a mixture of three isomers
 b. it has slower evaporation rate than toluene
 c. it is in the family of VMP Neptha
 d. all the above *

34. The main use of Xylene as a solvent is in
 a. alkyled resin enamels *
 b. quick drying rubber paints
 c. strains etc.
 d. all the above.

35. The boiling range of xylene is in the range of
 a. 60 - 85°C b. 85 - 120°C
 c. 120 - 150°C * d. 150 - 200°C.

36. The boiling range of Mineral spirits is
 a. 60 - 83°C b. 120 - 150°C
 c. 150 - 200°C * d. 200 - 300°C.

37. The boiling range of the kerosine is
 a. 120 - 150°C b. 200 - 250°C *
 c. 100 - 125°C d. 250 - 300°C.

38. The main use of mineral spirits is in
 a. alkyled resin enamels
 b. quick drying rubber paints
 c. formulation of amino resin *
 d. all the above.

39. Esters are the reaction products of
 a. Alcohols and acids * b. Acids and bases
 c. Acetate and Alcohols d. None of these.

40. The lowest boiling member of glycol ether series is
 a. Acetone b. Methyl cellulose *
 c. Methyl ethyl ketone d. Butyl cellulose.

41. Methyl cellulose is used
 a. for preparation of cellulose acetate dopes and thinners *
 b. to impart low viscosity to nitrocellulose solution
 c. to improve blush resistance of lacquers
 d. All the above.

42. Cellulose is used
 a. for preparation of cellulose acetate dopes and thinners
 b. to impart low viscosity to nitrocellulose solution *
 c. to improve blush resistance of lacquers
 d. all the above.

43. Butyl cellulose is used
 a. for preparation of cellulose acetate dopes & thinners
 b. to improve blush resistance of lacquers *
 c. for air craft finishes
 d. all the above.

44. ------------------------ is used as solvent for acid dyes
a. Butyl cellulose
b. Diethylene glycol mono ethyl ethers *
c. Acetone
d. Methyl ethyl ketone.

45. Which of the following is the property of Acetone
a. high dilution ratio b. low flash point
c. poor blush resistance d. all of these *

46. ------------------- is used for fabrics by knife coating process
a. Methyl Ethyl Ketone b. Acetone *
c. Cellulose d. Butyl Cellulose.

47. ------------------- is the best low cost solvent in variety of natural and synthetic resins
a. Acetone * b. Methyl ethyl ketone
c. Cellulose d. Butyl cellulose.

48. ------------------- is used as low boiling active solvent in nitro cellulose lacquers
a. Acetone b. Methyl Ethyl Ketone *
c. Cellulose d. Butyl Cellulose.

49. --------------------- is the desirable ingredient of paint and varnish removers and clean up solution
a. Acetone * b. Methyl Ethyl Ketone
c. Cellulose d. Butyl cellulose.

50. ------------------- is the high boiling constituent of nitro cellulose lacquers
a. Acetone
b. Methyl Ethyl Ketone
c. Diethylene glycol mono ethyl ether *
d. Butyl cellulose.

51. Which of the following is the property of cyclo-hexanone
a. high boiling cyclic ketone
b. promotes flow and glass
c. slow evaporation
d. all the above *

52. ------------------ is the excellent solvent for nitro cellulose& vinyl resins,
a. Diacetone alcohol b. Methyl oxide
c. Isoprene * d. Ketone.

53. Which of the following is the property of Methyl Isobutyl Ketone
a. faster evaporation rate
b. high solvency
c. good flow characteristics
d. all the above *

54. ------------------- is the high boiling cyclic ketone
a. Di isobutyl ketone b. Mesityl oxide
c. Acetone d. All the above *

55. Which of the following is the property of acetone
a. high dilution ratio * b. high flash point
c. good blush resistance d. slow evaporation.

56. Which of the following is a inorganic pigments
a. Zinc oxide * b. Signal red
b. Helco red d. Luminous.

57. Which of the following is inorganic pigment
a. Lithol red b. Para red
c. Zinc sulphide * d. White lead.

58. Which of the following is organic pigment
a. White led b. Zinc oxide
c. Lithol rubin * d. Titanium dioxide.

59. Toluidine Red is
a. organic pigment * b. inorganic pigment
c. special pigments d. none of these.

60. Chromate pigments are
a. white pigments b. coloured pigments *
c. organic pigment d. all the above.

61. Cadmium colours are
a. white pigments b. coloured pigments *
c. organic pigments d. all the above.

62. Alizarine Red is
a. inorganic pigment b. organic pigment *
c. special pigments d. none of these.

63. Antimony oxide is
a. inorganic pigment b. organic pigment *
c. special pigment d. none of these.

64. Which of the following is organic pigments
a. Letho pone b. Antimony oxide
c. Signal red * d. Luminous.

65. Which of the following is true for Natural pigments
a. exhibit opacity
b. hiding power invarying degree
c. used to provide colour
d. all the above *

66. The use of the natural true pigments is
a. to provide colour *
b. used as under coat for wood and metal
c. used as finishing base in alkyled enamels
d. used in exterior paints.

67. Antimony oxide has
a. good hiding powder
b. excellent chalk resistance
c. replaced titanium oxide
d. all the above *

68. -------------------- is used in fire retardant paints a. zinc sulphide b. titanium oxide
c. titanium dioxide d. antimony oxide *

69. ----------------- is used in flat & eggshell finishes
a. aluminium b. calcium *
c. barium d. magnesium

70. Which of the following is the extender pigments
a. barium * b. lithopone
c. zinc oxide d. zinc sulphide.

71. Which of the following is true for Barium extender pigments.
a. they have got heavy setting
b. low oil absorption
c. good adhesion
d. all the above *

72. ------------------------ are extended for water paints used in paper coatings
a. barium b. calcium
c. magnesium d. aluminium *

73. Carbon silicate & talc contains
a. Barium b. magnesium *
c. Aluminium d. none of these.

74. ------------------- is used for dryhiding of paint films
a. flattening pigments b. dryhiding pigments *
c. magnesium d. none of these.

75. Which of the following is true for calcium
a. it is easily dispersible b. reduces settling
c. increase film hardness d. all the above *

76. Which of the following is flattening pigments
a. Zinc stearate
b. soluble aluminium stearates
c. Diatomanonus silica
d. all the above *

77. China clay is ---------------------- extender
a. Barium b. Calcium
c. Aluminium * d. Magnesium.

78. Zinc stearate is ----------------------
a. dry hiding pigments b. flattening pigments *
c. both d. none.

79. ---------------------- is used in high gloss paints and coatings without effecting the finish
a. calcium * b. aluminium
c. barium d. magnesium.

80. --------------------- are used in barn paints, freight car paints, metal primers & wood filters
a. extender pigments b. iron oxide pigments *
c. antimony d. zinc oxide.

81. Which of the following is a property of iron oxide pigments
a. cleaner b. low cost
c. fastness to light d. all the above *

82. -------------------- is used as high boiling solvent for hitro cellulose lacquers
a. Diacetone Alcohols * b. Mesityle oxide
c. Isobutyl ketone d. Isoprene.

83. ------------------- is used in vinyl organosols
a. diacetone alcohol b. cyclo hexanone *
c. isoprene d. ketone.

84. ------------------- is used for making solid colour black goods
a. grey extenders b. carbon black *
c. inhibitive pigments d. none.

85. --------------------- is used in latex paints
a. iron blue b. cadmium colours *
c. iron blue d. chromate pigments.

86. Which of the following is a use of Chromate pigments
a. Corrosion inhibitors
b. Decorative purpose
c. Road marking
d. All the above *

87. ----------------------- is used in exterior chemical resistant coatings & high temperature coatings
a. Choromate pigments
b. Cadmium colours
c. Nickel titanium *
d. Iron blue.

88. Which of the following is not a property of Nickel titanium
a. Light fastness
b. Heat & acid resistance
c. Greenish appearance *
d. Alkali resistance.

89. The colour of Nickel Titanium is
a. Greenish b. Yellow *
c. Brown d. Black.

90. Which of the following is not a property of cadmium colour
a. Good colour stability
b. Stable to heat
c. Non toxic in nature *
d. All the above.

91. --------------------- is used in latex points
a. Chromate pigments b. Cadmium colours *
c. Nickel titanium d. Iron Blue.

92. Which of the following is a property of mercadmium pigments
a. they are based on mixed crystals of mercury & cadmium sulphides *
b. less chemical resistance
c. good heat resistance
d. all the above.

93. Which of the following is used to get medium to dark shade of blue
a. cadmium pigments b. iron blue *
c. nickel titanium d. chromate pigments.

94. Which of the following is not a property of iron blue.
a. high bulking value b. high tinting strength
c. in tense blue colour d. good alkali resistance *

95. Which of the following is the property of ultrasonic blue
a. clean reddish blue mass tone
b. low hiding power
c. excellent resistant to heat
d. all the above *

96. Which of the following is not general use of ultra sonic blue
a. used in latex paints *
b. used in surface coating
c. used in floor coverings
d. used as textile colourant.

97. ----------------- is used as a burning agent for white products
a. iron blue b. ultrasonic blue *
c. chrome green d. cadmium colours.

98. Which of the following is not the property of chrome greens
a. low hiding power * b. bright masstone colour
c. excellent texture d. can be dispersed easily.

99. Which of the following is the use of Chrome Greens
a. used in exterior finishes
b. architectural finish
c. maintenance finishes
d. all the above *

100. Which of the following is the 'basic inhibitive' pigments
a. red lead b. chromate *
c. lead plumbate d. zinc oxide.

101. Which of the following is the property of basic inhibitive pigments
a. high specific gravity *
b. high oil absorption
c. high paint thickening power
d. all the above.

102. Which of the following is a soluble inhibitive pigment
a. Read lead b. Chromate *
c. Lead plumbate d. Zinc oxide.

103. Which of the following is not the use of basic inhibitive pigments
a. used in under coats for iron & steel
b. used in primers *
c. used for colour stability
d. all the above.

104. -------------------------- is used for making solid colour black goods in high grade finish
a. Carbon black * b. Suit black
c. Grey extenders d. Lead plumbate.

105. --------------------- is used in fillers, putties; caulking compounds and other surface coatings
a. carbon black b. grey extenders *
c. phosphate pigments d. iron blue.

106. Which of the following is better pigment
a. signal red pigment * b. toluene red pigment
c. both are same d. none of these.

107. ---------------------- is lowest in cost
a. signal red b. para red
c. Lithol red * d. helcored.

108. Which of the following lithol is/are available
a. sodium b. calcium
c. barium d. all of the above *

109. --------------------- is used for surface coatings enamels and printing inks
a. signal red b. lithol red *
c. helcored d. toluidine.

110. -------------------- is fast to light and does not change upto 150°C
a. signal red b. lithol red
c. helcored * d. toluidine.

111. Which of the following is yellow pigment ?
a. Helcored b. Hansa *
c. Sodium salt d. Toluidine.

112. Which of the following is Red pigment
a. Helcored * b. Hansa
c. Sodium salt d. Toluidine.

113. Which of the following is orange pigment
a. Helcored b. Hansa
c. Sodium salt * d. Toluidine.

114. Which of the following is maroon pigment
a. Helcored b. Hansa
c. Sodium salt d. Toluidine *

115. Which of the following yellow pigment is used in printing inks
a. Hansa yellow
b. Hansa Yellow 'RN' *
c. Benzidine Yellow
d. All the above.

116. Which of the following is the property of Hansa Yellow
a. Bright mass tone colour
b. Bright under tone colour
c. High oil absorption
d. all the above *

117. Which of the following is true about Hansa Yellow 'RN'
a. slightly less red than Hansa Yellow
b. bad light fastness
c. used in surface coatings *
d. all the above.

118. Which of the following is the property of Benzidine Yellow
a. Good light fastness b. High tinting strength *
c. Both d. none.

119. ------------------ is used for the preparation of aluminium lake
a. Sodium salt * b. Toluidine Maroon
c. Lithol reds d. Hansa Yellow.

120. Which of the following is true about Maroon pigments
a. they are permanent towards light
b. they are resistant to alkali and acids
c. they are used in finishes
d. all the above *

121. Which of the following is true about Azorondensation pigments
a. improved resistance to solvents
b. increased resistance to heat
c. increased resistance to light
d. all the above *

122. Which of the following pigments contain Anthraquinane group
a. Helcored b. Alizarine Red *
c. Lithol red d. Signal red.

123. Which of the following is true about Alizarine red
a. they are bright red in colour *
b. high hiding power
c. low oil absorption rate
d. all the above.

124. Which of the following is false about Alizarine red
a. low hiding power
b. good light fastness
c. poor weathering resistance *
d. none of the above.

125. Alizarine red is used in -------------------- finishes.
a. Interior
b. Exterior
c. Both interior and exterior *
d. None.

126. Which of the following is true about phthalocynaine Blue
a. it has plum masstone
b. it is hard and gritty in texture
c. used for tinting in paints
d. all the above *

127. ---------------------- is used for tinting in paints when high degree of colour performance is desired
a. Alizarine red b. Phthalocynaine blue *
c. Quinacridone d. All the above.

128. Which of the following is true about Quinacridone
a. these are dark red, maroon and voilet shaded pigments
b. they have excellent resistance to heat and bleed
c. they are expensive
d. all the above *

129. ------------------------- are generally used in automobile finishes
a. Alizarine red b. Phthalocynaine blue
c. Quinacridone * d. None of these.

130. ---------------------- is used in high visibility safety paints aircraft, traffic strips etc.
a. Lithol red b. Helcored
c. Flourescent pigments *
d. All the above.

131. Which of the following is true for fluorescent pigments
a. lower in hiding powers
b. they are available in limited range of colors in red, yellow & orange shades
c. they can be varied by mixing two or more of them
d. all the above *

132. Which of the following is true about luminous pigments
a. they glow in dark
b. they are made of radioactive materials
c. they are produced in various colours
d. all the above *

133. Which of the following are the special pigments
a. fluorescent pigments b. luminous pigments
c. pearlescent pigments d. all the above *

134. The organic dyes & pigments contain
a. chromophoric group b. anthraquinone group
c. any of the above * d. none of the above.

135. Which of the following is the advantage of the inorganic pigments over organic pigments
a. Cheaper b. More light fast
c. Better heat resistant d. All the above *

136. Quantity wise the production of --------------------- pigments is larger
a. Organic b. Inorganic *
c. Toners d. Dubious.

137. Lake is a
a. water soluble pigment *
b. water insoluble pigment
c. any of the above
d. none of these

138. If the salt formation can be substantially completed without the presence of a substrate, the product is called
   a. lake b. toner *
   c. dutone d. substrater

139. Other names of Aluminium pigment is
   a. lakes b. toner
   c. gold bronze * d. none of these

140. The compounds which assist catalytically the oxidation and polymerization of drying oil based surface coating compositions
   a. driers * b. auxilliary driers
   c. primary driers d. all the above.

141. --------------- are the true catalyst
   a. primary driers * b. secondary driers
   c. settlers d. foamers.

142. ---------------- are the important primary driers
   a. cobalt soaps b. manganese soaps
   c. lead soaps d. all the above *

143. Primary driers exhibit
   a. 1 state valency b. 2 state valency *
   c. 3 state valency d. 4 state valency.

144. ------------------ driers do not exhibit any catalytic action
   a. primary b. toners
   c. secondary * d. none of these.

145. Which of the following is not a secondary drier
   a. calcium soaps b. barium soaps
   c. zinc soaps d. cobalt soaps *

146. The function of antiskinning agents is ----------------
   a. same as driers b. opposite to driers *
   c. to wet the salts d. all the above.

147. The antiskinning agents -------------------------- the oxidation
   a. accelerate b. retard *
   c. stop d. none of these.

148. Which of the following is antioxidants ?
   a. quinones b. hydroquinone
   c. lecithin * d. both (a) and (b).

149. Which of the following is wetting agent
   a. quinones b. hydroquinone
   c. lecithin * d. turkey red oil.

150. Which of the following is/are used as grinding agent
   a. zinc naphthenates
   b. calcium naphthenates
   c. magnesium naphthenates
   d. all the above *

151. If the setting is easily dispersable it is called
   a. soft settling * b. hard settling
   c. neither settling d. drop settling.

152. ----------------- are generally used as antisettling agents
   a. metal soaps
   b. metal soaps of fatty acids *
   c. non-metallic soaps
   d. none of these.

153. When the paints contain different colours ----------------- occurs
   a. floating * b. flooding
   c. any of the above. d. none of the above.

154. The ability of the wet film to give a uniform smooth surface on drying is called
   a. levelling * b. doping
   c. sloping d. flocculating.

155. The property of the wet film to run downwards when they are applied to sloping surface is called
   a. levelling b. sagging *
   c. flocculating d. antifoaming agents.

156. Levelling of paint can be improved by incorporating
   a. zinc benzoate b. zinc oxide
   c. benzoic acid d all the above *

157. The temperature at which the sample begins to soften and flow is called
   a. insoluble point b. softening point *
   c. toluble point d. none of these.

158. ----------------- can be used to differentiate between aliphatic and aromatic hydrocarbons
   a. odour b. colour
   c. specific gravity * d. all the above.

159. The ability of the painted surface to reflect light is called
   a. gloss * b. dross
   c. dryness d. shiverity.

160. The resistance of the coating to distortion called
   a. flexibility * b. scratch hardness
   c. fatness to light d. all the above.

161. The property of resisting a paint film towards ultravoilet & visible light
   a. fastness to light * b. opacity
   c. transparency d. none of these.

162. The most widely used and the oldest used method of painting and surface coating
   a. brushing * b. spraying
   c. hot spraying d. dipping.

163. Which of the following is an aircraft finishes
   a. nitro - cellulose finishes *
   b. acrylic finishes
   c. epoxy finishes
   d. all the above.

164. ------------------- give quick drying films of adequate resistance
a. nitro cellulose finish * b. acrylic finish
c. epoxy finish d. alkyd system.

165. --------------- gives high gloss finish of average film weight
a. alkyd systems * b. nitro cellulose finish
c. acrylic finish d. epoxy finish.

166. --------------- have very good stability to light and heat
a. alkyd systems b. nitro cellulose finish
c. acrylic finish * d. epoxy finish.

167. ---------------- have good chemical and solvent resistance
a. alkyd systems b. acrylic finish
c. epoxy finish * d. polyurethane finishes.

168. Which of the following is the property of epoxy finishes
a. good chemical and solvent resistance
b. good protection from corrosive
c. good adhesion
d. all the above *

169. ----------------- is used in missiles,& space vehicles for the interior & exterior protection of aircrafts
a. alkyd system b. acrylic finishes
c. epoxy finishes * d. all of the above.

170. Which of the following is the property of polyurethane finishes
a. excellent gloss b. durability
c. colour d. all the above *

171. ---------------- gives quick drying films of adequates resistance
a. nitro cellulose finishes *
b. alkyd systems
c. acrylic finish
d. epoxy finish.

172. ----------------- gives a high gloss finish of average film weight
a. nitro cellulose finishes b. alkyd systems *
c. acrylic finish d. epoxy finish.

173. ------------------ is a light aircraft finishes
a. vinyl b. acrylics
c. zinc chromate d. all the above *

174. --------------- paints are used as exterior finishes
a. vinyl * b. zinc chromate
c. polyamides d. all the above.

175. -------------- are applied to anodised surfaces
a. zinc chromate * b. vinyl
c. acrylics d. polyamides.

176. Which of the following is the property of polyamides
a. good adhesion
b. good flexibility
c. excellent heat and solvent resistance
d. all the above *

177. -------------- are used for protecting air craft during storage, shipment & temporary protectives
a. vinyls b. strippable coating *
c. good adhesion d. good flexibility.

178. --------------- are applied to aluminium structures of aircraft
a. strippable coatings b. etch primers *
c. vinyl d. acrylics.

179. Which of the following is a property of universal primers
a. good adhesion b. corrosion inhibition
c. durability d. all the above *

180. --------------- is most important pigment because of its exceptional corrosion inhibitor
a. acrylics b. strontum chromate *
c. anti radar paint d. all the above.

181. -------------- is rain resistant coating
a. strontium chromate
b. polyurethane & ketimine *
c. anti radar paint
d. none of these.

182. ------------------- is used to minimize enemy detection & tracking during mission operation
a. strontium chromate b. poly urethane
c. anti radar paint d. camouflage *

183. --------------- is used for detection free protection
a. strontium chromate b. poly urethane
c. anti radar paint d. camouflage *

184. Which of the following is used in Naval aircrafts
a. epoxy primers b. etch primers
c. camouflage d. all the above *

185. Which of the following is true for rain repellent
a. it is used for aircraft glass or plastic wind screen
b. it is applied by hand on the external surface of aircraft screen
c. when it is used, the use of wipers is minimized
d. all the above *

186. Which of the following is false about rain repellent
a. it is clear and colourless
b. slightly fuming liquid free from impurities
c. both
d. none *

187. The silicon content in Rain repellent is
a. 1 - 2 % b. 2 - 3 % *
c. 5 - 7 % d. 10 %.

188. The shelf life of Rain repellent is
   a. 6 months b. 1 year
   c. 2 years * d. 4 years.

189. ------------------- is used on the external surfaces of aircraft glass or plastic wind screens
   a. Rain repellent *
   b. ENAMEL
   c. Corrosion resistance enamel
   d. Primer.

190. Which of the following is true about enamel DR OC4 1517/78
   a. it is high heat resisting Aluminium enamel
   b. it is prepared by mixing 100 ml of varnish with 7g of leafing aluminium paste
   c. this does not show any loss in glass
   d. all the above *

191. Which of the following is false for enamel DR OC4 1517/78
   a. it is transparent straw coloured liquid
   b. it is not free from foreign impurities
   c. both
   d. none *

192. The viscosity of varnish in (centi stokes) is
   a. 2 - 3 Cs b. 3 - 4 Cs *
   c. 8 - 10 Cs d. None

193. The shelf life of Enamel DR OC4 1517/78
   a. 1 year b. 2 year *
   c. 3 year d. 4 year.

194. Enamel CG - B 55 A has, which, of the following properties
   a. it is used in the preparation of high temperature enamel
   b. it is used along with chromium oxide and china clay
   c. it is used over nickel base alloys as high temperature coating
   d. all the above *

195. The colour of Enamel CG - B 55 Ais
   a. reddish b. green *
   c. blue d. orange.

196. Which of the following material is not used for preparation of Enamel CG - B 55 A
   a. Quartz b. Barium carbonate
   c. Zinc chromate * d. none

197. The surface finish of Enamel CG - B 55 A is
   a. Glassy * b. Rough
   c. Plain d. None of these.

198. -------------------- is used for high temperature enamel on R11F, R-25 F and R-29 B
   a. CG - B 55 A * b. Alucoat Resistance
   c. Zinc chromate d. none of these.

199. Which of the following is true for Alucoat process
   a. it is used for painted and unpainted panels of aircraft
   b. it is light yellow to brown colour
   c. it is corrosion resistance
   d. all of the above *

200. The colour of alucoat is
   a. light yellow to brown *
   b. red to orange
   c. brownish to black
   d. black.

201. -------------------- is applied to painted and unpainted panel of aircraft as per MIL - C - 5541
   a. Alucoat process * b. Zinc Chromate primer
   c. BA CM 346 D d. None of these.

202. Zinc Chromate primer has which of the following properly
   a. It is Apcolite Red Oxide Primer
   b. This is used for USSR Primer grade G FO32
   c. This has Brown shade
   d. all of these *

203. Apcolite Zinc Chromate primer has shades of
   a. Black b. Brown *
   c. Red d. Green

204. -------------- is used for primary of steel parts by spray bush or dipping
   a. Alucoat process
   b. Apcolite Zinc Chromate primer *
   c. Corrosion resistance enamel
   d. None of these.

205. Which of the following is the property of Shalimar Erosion resistance material
   a. it is resistance to chemicals
   b. it is resistance to oil and heat
   c. it processes gold adhesion & mechanical properties
   d. all the above *

206. Which of the following is true for colour and appearance of erosion resistant enamel
   a. the colour is cream
   b. smooth and uniform homogeneous liquid
   c. both *
   d. none.

207. The shelf life of shalimar erosion resistant enamel is
   a. 6 months b. 9 months *
   c. 10 months d. 1 year.

208. The shalimar erosion resistant enamel is stored in
   a. open sunlight
   b. dark and cold storage *
   c. tin containers
   d. poly bags.

209. The drying time for shalimar erosion resistant enamel is
a. 1.5 - 2 hrs. * b. 5 - 7 hrs
c. 7 - 9 hrs d. 15 hrs.

210. -------------------- is used for applications on stage I and II compressor rotor blades of MIG series engines
a. Alucoat process
b. Shalimar erosion resistance enamel *
c. Thinner
d. none of these.

211. ------------------ is used to thin N.C Laquers for spraying on aircraft components during winter and rainy season
a. South Lack Antichill thinner *
b. Alucoat
c. Acrylic paints
d. perspex.

212. ------------------ is suitable for mixing in all proportions with nitrite paints, drops and varnishes
a. Polish perspex b. Epoxy paint
c. Epoxy primer d. Southlack thinner. *

213. Which of following is true for Etch primer
a. it possess corrosion inhibiting properties
b. it is supplied in two components
c. it is suitable for application by spraying
d. all the above *

214. Pigment content in the base component of etch primer should be
a. not less than 5% b. not less than 10 %
c. not less than 15% * d. not less than 25 %.

215. The amount of orthophosphoric acid in acid component shall be
a. not less than 2% b. not less than 6.5% *
c. not less than 8% d. not less than 20%.

216. is used for applications to metal surfaces to improve the adhesion
a. Etch primer * b. Alucoat process
c. Southlack finish coat d. None of these.

217. Which of the following is true for southlack finish coat paint material for cellulose finishing scheme
a. it is the substitute to DTD 899 A
b. it mixes well with laquer thinners
c. it is suitable for application by brushing or spraying
d. all the above *

218. Which of the following is true for appearance of southlack finish coat
a. glassy finish
b. surface is smooth
c. surface is uniform and free from any blushing
d. all the above *

219. The mixibility of south lack finish coat with thinner is
a. good * b. bad
c. fair d. average.

220. Which of the following is true for the south lock finish coat
a. free from objectionable ingredients
b. it is homogeneous, smooth and uniform
c. the film paint does not show any flaking, change color or blistering
d. all the above *

221. The drying time for southlack finish is
a. 1 hr b. 2 hrs *
c. 4 hrs d. 10 hrs.

222. ------------------ is used as finish coat in aircraft industry where resistance to water lubricant is required
a. South lack finish coat *
b. Alucoat process
c. Etch primer
d. All the above

223. Which of the following is true for Enamel FRIT CG - ABK 13
a. it is developed from silicate frits
b. in these coatings the crystallization is controlled by formation and heat treatment
c. the colour has shades of blue
d. all the above *

224. The surface finish of glass ceramic CG - ABK 13
a. smooth & glassy * b. rough
c. acrylic paints d. none of the above.

225. ---------------- is used for application on R - 25 engines is lieu of USSR enamel frit BK - 13
a. Enamel Frit CG - ABK 13 *
b. Epoxy paints
c. Acrylic paints
d. None of these.

226. Which of the following is true about the Epoxy primers yellow
a. They have dominated other primers in aviation industry
b. they consist of suitable pigmented primer based on epoxy resin vehicle
c. they have good resistance to air craft fluids and resistance to corrosive environments
d. all the above *

227. Pot life of the Epoxy primers yellow is
a. 6 hrs b. 8 hrs *
c. 10 hrs d. 12 hrs.

228. The drying time for Epoxy primers Yellow is
a. 1 hr b. 1½ hrs *
c. 2 hrs d. 4 hrs.

229. The Epoxy primers get hard dried in
a. 2 hrs b. 6 hrs *
c. 40 hrs d. 50 hrs.

230. Which of the following is true for Epoxy Matt Black paint
   a. it is a two component cold curing paint
   b. it is used for drying finishing on exterior surface of aircraft
   c. the maximum temperature at which it can be used is 150°C
   d. all of the above *

231. Which of the following is true about acrylic paints
   a. stability to light and heat
   b. fair fluid resistance
   c. good suitability for finishing schemes for supersonic air craft
   d. all the above *

232. Which of the following is the advantage of Acrylic paints
   a. Rapid drying characteristics
   b. Reasonable durability
   c. can be polished to high glass
   d. all the above *

233. The colour of acrylic paints is
   a. Black b. Green *
   c. Brown d. Blue

234. The mixibility of acrylic paints with thinners is
   a. good * b. poor
   c. fair d. none of the above.

235. The shelf life of acrylic paints is
   a. 9 moths b. 10 months
   c. 12 months * d. 15 months.

236. The drying time for the acrylic paints is
   a. 1 hr * b. 2 hrs
   c. 3 hrs d. 5 hrs.

237. Which of the following is true for heat insulation K-400 coating
   a. it is used in Ist stage compressor hollow stator blades of R -25 engines
   b. the stove dried film is white to yellow
   c. both * d. none.

238. The colour of heat insulation K - 400 coating is
   a. white to yellow * b. orange
   c. red d. green.

239. is used for the heat insulation coating which is used on Ist stage compressor hollow stator blades of R - 25 series of R - 25 series engines
   a. polish perspex
   b. insulation K -0 400 coating *
   c. Acrylic paints
   d. none of these.

240. Which of the following is true for polish perspex
   a. it is complex oil-wax-water emulsion
   b. it contains mineral polishing powder and is stabilized by emulsifiers and stabilizers
   c. it gives clear bright surface on polishing
   d. all of these *

241. The ash content in polish perspex is minimum
   a. 4 % b. 8% *
   c. 12 % d. 20%.

242. Which of the following is true about anti radar paint (RAP - MK -1)
   a. It is a low density conducting polymer
   b. It is developed by using polyanitine PANI - 12
   c. The paint RAP - MD - 1 can absorb microwave energy in X band
   d. All the above *

243. Which of the following is the property of RAP-MK-1
   a. low reflectivity invisible and IR region of electro magnetic spectrum *
   b. it has too good radio - transparency with transmission loss
   c. it has antistatic property
   d. all the above.

244. The colour of RAP-MK-1 is
   a. grayish black * b. brown
   c. red d. orange

245. The drying time for RAP-MK-1 is
   a. 2 hrs. b. 4 hrs.
   c. 6 hrs. * d. 9 hrs.

246. The dry residue content in RAP-MK-1 is
   a. 20% b. 35%
   c. 41% * d. 90%.

247. ----------------- is used in aircrafts to safeguard against radar detection
   a. RAP-MK-1 * b. MASK - 522
   c. RAP - 52 d. None of these.

248. Which of the following is the property of MASK - 522 is
   a. it is a PVC based paint
   b. it is developed for chemical milling parts
   c. the viscosity is 23.3 poise
   d. all the above *

249. The flash point of MASK - 522 is
   a. 10°C b. 15°C
   c. 20°C d. 30°C *

250. The shelf life of MASK - 522 is
   a. 6 months b. 1 year
   c. 1½ years * d. 2 years

251. The tensile strength of MASK - 522 is
   a. 5 MPa b. 6.7 MPa *
   c. 20 MPa d. 50 MPa.

252. ---------------------- is used for chemical milling of aerospace parts
   a. MASK - 522 * b. 20 MK - 1
   c. RAP - MK - 1 d. None of these.

■■■

CHAPTER - 109
VARNISHES

1. Which of the following is true for Varnish
   a. it is a homogeneous transparent or translucent liquid
   b. it dries on exposure to a continuous and tough glossy film
   c. the film dries up by evaporation, oxidation and polymerization
   d. all the above *

2. The paints can be differentiated from varnishes with respect to
   a. absence of pigments
   b. substitution of oil either whole or partly by resin
   c. both *
   d. none.

3. Varnishes include
   a. film forming materials b. driers
   c. solvents & thinners d. all the above *

4. The purpose of film forming materials in varnishes is
   a. that they form protective films
   b. they serve as binders for pigments
   c. both *
   d. none.

5. Which of the following is film following materials
   a. oils b. resins
   c. both * d. none.

6. Which of the following is oil for film forming materials
   a. amnila kauri b. oil fossil
   c. copal d. dehydrated castor *

7. Which of the following is resin for film forming materials
   a. castor b. fish
   c. phenol aldehyde * d. cotton seed.

8. Which properties do oil improve in film forming materials
   a. elasticity b. toughness
   c. durability d. all *

9. Which properties do resins improve in film forming materials
   a. hardness * b. toughness
   c. elasticity d. all the above.

10. The purpose of driers is
    a. to increase the rate of drying
    b. to increase the rate of hardening
    c. to increase the polymerization of the oil
    d. all the above *

11. Which of the following is not used as drier
    a. rosinates b. linoleates
    c. coconut * d. cobalt.

12. The purpose of solvents is
    a. to control viscosity *
    b. to increase the rate of drying
    c. to form protective film
    d. all the above.

13. Most common thinner is
    a. Castor b. White spirit *
    c. Turpentine d. Kerosene.

14. The most widely used resin in spirit varnishes is
    a. Shellac * b. Castor
    c. Kerosene d. None of these.

15. Spirit varnishes are
    a. volatile *
    b. non-volatile
    c. can't say
    d. depend on the viscosity.

16. Which of the following determines the properties of testing varnishes
    a. colour b. viscosity
    c. drying time d. all the above *

17. Dark colour of varnishes is due to
    a. high molecular weight
    b. excessive heating *
    c. high resins content
    d. all of these.

18. Drying time of varnish depend upon
    a. composition b. temperature
    c. humidity d. all the above *

19. Which of the following is true for Pentaphthalic varnish RDL - 919
    a. it is used to protect anodised aluminium alloy parts from corrosion
    b. it is used to paint hatch covers in Canopy section
    c. it has good resistance to water benzene and temperature cycling
    d. all the above *

20. ---------------- is anti corrosive coating on parts on anodised aluminium alloy during storage
    a. Varnish RDL -919 * b. Varnish 1126
    c. Varnish 1200 d. none of these.

21. Which of the following is true for insulating varnish 1126
    a. it is used to protect anodised corrosion
    b. it is used to paint hatch covers in canopy
    c. it has good resistance to water, benzene & temperature cycling
    d. all the above *

22. Which of the following is true for varnish SSAV - 005
    a. it is made from silicon resin dissolved in toluene or xylene
    b. this can be used for preparation of heat resistant enamel KO - 813
    c. both *
    d. none.

23. The shelf life of varnish SSAV - 005 is
    a. 6 months b. 1 year *
    c. 1½ years d. 2 years.

24. ------------------ is used for coating of RIIF engine components operating upto 500°C
    a. Varnish SSAV - 005 * b. Varnish SSAV - 007
    c. Varnish VB - 05 d. none of these.

25. The shelf life of Varnish SSAV - 007 is
    a. 6 months b. 1 year *
    c. 1½ years d. 2 years.

26. Which of the following is true for varnish SSEV - 601
    a. it is used for aeronautical application
    b. it is used of impregnation of starter generator for armature for MIG series
    c. it is used in place of KO - 915
    d. all the above *

27. The colour of Varnish SSEV - 601 is
    a. homogeneous light yellow to brown *
    b. orange to red
    c. green
    d. black.

28. Which of the following is true about SSAV - 002
    a. 40 minutes b. 20 minutes
    c. 55 minutes * d. 79 minutes.

29. The drying time of Varnish SSEV - 601 is
    a. it is used in place of BL - 725
    b. when mixed with aluminium powder, it is suitable for external applications of aeroengines
    c. it is transparent
    d. all the above *

30. Shelf life of SSAV - 002 is
    a. 1 year * b. 2 year
    c. 6 months d. 13 year.

31. Dry residue content in SSAV - 002 is
    a. 11% * b. 22%
    c. 33% d. 44%.

32. --------------------- is used in coating of accessory gear box components
    a. SSAV - 001 b. SSAV - 007
    c. SSAV - 005 d. SSAV - 002 *

■■■

CHAPTER - 110
FUELS

1. The fuels which are manufactured from Natural fuel are called
   a. Primary fuels b. Secondary fuels *
   c. Tertiary fuels d. None.

2. Which of the following is a primary fuel ?
   a. Coke b. Charcoal
   c. Lignite * d. Tar.

3. Which of the following is a secondary fuel ?
   a. Anthracite b. Peat
   b. Lignite d. Acetylene *

4. Tar is a
   a. Primary fuel b. Natural fuel
   c. Secondary fuel * d. None.

5. Colloidal fuels are
   a. Liquid fuels * b. Gaseous fuels
   c. Primary fuels d. Nuclear fuels.

6. For metallurgical purposes ------------------ coal is widely used
   a. Anthracite * b. Bituminous
   c. Lignite d. Peat.

7. The correct sequence of processes of coal formation
   a. Peat, lignite, anthracite, bituminous
   b. Anthracite , bituminous, lignite, peat
   c. Peat, lignite, bituminous, anthracite *
   d. Lignite, peat, bituminous, anthracite.

8. $(C_6H_{10}O_5)_n$ is
   a. Glucose b. Cellulose *
   c. Fructose d. Lactose.

9. Which of the following is not the constituent of wood
   a. Cellulose b. Lignin
   c. Sugar d. Fructose *

10. The study of the individual constituents and compounds in coal is
    a. Constituent analysis b. Rational analysis *
    c. Proximate analysis d. All the above.

11. Which of the following is done for the constitution of coal only
    a. Rational analysis b. Petrographic analysis *
    c. Proximity analysis d. All of the above.

12. Which of the analysis is done for the practical classification of coals.
    a. Rational analysis b. Petrographic analysis
    c. Proximity analysis * d. All the above.

13. Rational analysis includes
    a. Leaching coal with organic solvents
    b. Destructive distillation at different temperatures
    c. Chemical reaction and micro structural studies
    d. All of the above *

14. Petrographic analysis include
    a. Leaching of coal with organic solvents
    b. Fractional distillation at different temperatures
    c. Chemical reaction
    d. Microstructural studies *

15. Which of the following are the critereas of coal quality
    a. percent carbon
    b. percent sulphur
    c. percent ash & calorific value
    d. all the above *

16. The coherent cellular residue from destructive distillation of the coal in absence of air is called
    a. ash
    b. coke *
    c. pulverized coal
    d. pitch coke.

17. The process by which coke is produced
    a. coaking
    b. carbonization
    c. destructive distillation
    d. all the above *

18. Which quality of coal has maximum percentage of fixed carbon in
    a. lignite b. bituminous
    c. anthracite * d. peat.

19. Which of the following statements of chemical theory of pyrolysis of coal is false
    a. as the temperature is raised, the aliphatic carbon-carbon bonds are first to break
    b. C - H bonds break at 600°C
    c. The average molecular weights of the volatile intermediate products constantly increase as the temperature of carbonization rises *
    d. none of the above.

20. Pitch coke is made from
    a. wood pitch b. coaltar pitch
    c. peat pitch * d. none.

21. Pitch coke has
    a. high carbon b. low sulphur
    c. low ash d. all the above *

22. Pitch coke is used for
    a. manufacture of electrodes
    b. foundry for open hearth furnace
    c. production of silicon carbide
    d. all the above *

23. Coking of a residual is
    a. carbonization process
    b. decarbonization process
    c. oxidation process *
    d. sulphorification process.

24. Petroleum coke has carbon - hydrogen ratio
    a. less than 10 b. 15
    c. less than 18 * d. more than 20.

25. Powdered coke contains volatile matter
    a. at least 10% * b. at least 25%
    c. at least 30% d. none.

26. High vanadium content is associated with
    a. high carbon content
    b. low carbon content
    c. high sulphur content *
    d. low sulphur content.

27. Silicon carbide is prepared by heating Silica & Carbon in
    a. Open hearth furnace b. Blast furnace
    c. Resistance furnace * d. Cupola furnace.

28. In the formation of carbides, which of the following reaction takes place ? (Me - metal, C - carbon)
    a. $MeC + CO_2$ ® $MeO + C$
    b. $MeO + 3CO_2$ ®$MeC + 2CO_2 + O_2$
    c. $MeO + C$ ® $MeC + CO$ *
    d. $MeO_2 + C$ ® $MeC + CO_2$.

29. Which of the following is the hardest known synthetic abrasive
    a. SiC b. Boron Carbide *
    c. Tungsten Carbide d. Aluminium Carbide.

30. 1 ton of silicon carbide requires -------------------- tons of carbon
    a. 1.2 b. 3.8
    c. 1.4 * d. 2.8.

31. Boron carbide is made from
    a. Boric acid b. Petroleum coke
    c. Kerosene d. All the above. *

32. In foundry coke the major component is
    a. petroleum coke * b. pitch coke
    c. ash coke d. anthracite.

33. Densite coke is
    a. Petroleum coke * b. pitch coke
    c. kerosene d. anthracite.

34. Densite coke contains
    a. 50% petroleum coke
    b. 25% low- volatile coal
    c. 12.5 anthracite fines
    d. All the above *

35. Densite coke is also called
    a. pitch coke b. foundry coke *
    c. petroleum coke d. Calcined coke.

36. Which of the following is not a property of foundry coke?
    a. lower ash content
    b. low internal porosity
    c. low uniform microstructure *
    d. low volatile coal

37. The high temperature treatment of petroleum coke in which C-H ratio is increased from 20 to 1000 is called
    a. Distillation
    b. Calcination *
    c. Coking
    d. Doping.

38. Calcination process is necessarily used in
    a. Electrode manufacture *
    b. foot wear industry
    c. metallurgy of aluminium
    d. all the above.

39. Liquid fuels are derived from
    a. crude oil b. coal
    c. both * d. none.

40. The main contents of petroleum are
    a. sulphur b. hydrocarbons *
    c. carbon monoxide d. none.

41. Petroleum contains
    a. paraffins b. olefins
    c. naphthenes d. all the above *

42. The suffix "one" is used in hydrocarbon where carbon-carbon bonds are
    a. single * b. double
    c. Tripple d. none of the above.

43. The general formula of Alkanes is
    a. C_nH_{2n+2} * b. C_nH_{2n}
    c. C_nH_{2n-2} d. any of the above.

44. Which of the following is true for Alkanes
    a. the general formula is C_nH_{2n+2}
    b. they are quite stable
    c. they have lower specific gravity
    d. all the above *

45. Normal paraffins and Iso - paraffins are
    a. Alkanes * b. Alkenes
    c. Alkynes d. none.

46. Which of the following is false about 'paraffinic hydrocarbons
a. These hydrocarbons are clean in burning
b. these ignition point is quite high *
c. they are quite stable
d. they have lower specific gravity

47. When normal paraffins are arranged in modified form, they are called
a. N - paraffin b. Iso paraffins *
c. Both d. None.

48. Olefin have Carbon - Carbon
a. Single bond b. Double bond *
c. Tripple bond d. None.

49. The olefins are used with the suffix
a. 'ane' b. 'ene'
c. 'yne' * d. any of the above.

50. Which of the following is true about Alkenes
a. they have double carbon-carbon bond
b. they are unsaturated hydrocarbons
c. their chemical formula is C_nH_{2n}
d. all the above *

51. Olefins can be generally distinguished by
a. colour b. volume
c. odour * d. all.

52. Which of the following is not a property of olefins
a. they are chemically less active than other hydrocarbons
b. they have good burning characteristics because they get oxidized easily
c. their thermodynamics properties are similar to paraffins
d. all are the properties of olefins. *

53. Olefins are present in large quantities in
a. Cracked oil * b. kerosene oil
c. spirit c. none.

54. Nephthalenes are designated by the term
a. 'enes' b. 'ynes'
c. 'ane' d. 'cyclo' *

55. Nephalenes have general formula equal to
a. C_nH_{2N+2} b. C_nH_{2n} *
c. C_nH_{2n-1} d. C_nH_{2n-2}.

56. Difference between Nephthalenes and Olefins is
a. they have different general formula
b. the nephthalenes are saturated but olefins are not*
c. Nephthalenes are unsaturated but olefins are not
d. none of the above.

57. Simplest nephthalene is
a. cyclo-octane b. cyclo-ethane
c. cyclo propane * d. cycloethylene.

58. Naphthenes are found in
a. Light oils b. Heavy oils *
c. Any d. None.

59. Aromatics are the hydrocarbon which have
a. Single bond b. Double bond
c. Benzene ring * d. None.

60. Benzene ring contains ------------ carbon atoms
a. 4 b. 2
c. 5 d. 6 *

61. Aromatics are undesirable in kerosene because
a. they have high specific gravity
b. they have tendency to smoke *
c. they are stable under heat
d. they are chemically active to moderate degree.

62. Crude oil contains
a. methane gas b. paraffin wax
c. bitumen d. all the above *

63. Crude oil is called paraffinic if
a. Aliphatic groups are greater than 75% *
b. Naphthenic rings are greater than 70%
c. Aromatic rings are greater than 60%
d. All the above.

64. Crude oil is called Asphaltic if:
a. Aliphatic groups are greater than 75%
b. Naphthenic rings are greater than 70%
c. Aromatic rings are greater than 60% *
d. All the above.

65. Most of the crude oils are :
a. Paraffinic b. Naphthenic
c. Asphaltic d. Mixed type *

66. The oil used of controlling reforming is called
a. Heating oil b. Quenching oil *
c. Reforming oil d. All

67. Requirement of octane no: of gasolene is
a. 80 b. 90
c. 95 d. 100 *

68. The most attractive method of achieving high octane no of gasolene is
a. Catalytic reforming * b. Thermal reforming
c. Both d. None

69. Benzene is produced by reforming from
a. Cyclo hexane * b. toluene
c. methyl -cyclohexane d. None

70. Toluene is produced by reforming from
a. Cyclohexane b. toluene-benzene *
c. methyl-cyclohexane d. None.

71. Which of the following gas is used for high grade aviation gasolene ?
    a. Xylene b. Benzene
    c. Toluene d. All the above *

72. The temperature in catalytic reforming is kept around
    a. 280-300ºC b. 300-350ºC
    c. 420-460ºC d. 480-540ºC *

73. The catalyst used in catalytic reforming contains ________ percent platinum by weight.
    a. 0.65 b. 0.75 *
    c. 0.8 d. 0.9

74. The catalyst used in catalytic reforming contains ________ percent molybdenum.
    a. 4-5% b. 8-10% *
    c. 10-12% d. 12-15%

75. In plat forming ______________ is used as catalyst
    a. Platinum * b. Tungsten
    c. Molybdenum d. All

76. The main reactions in catalytic plat forming are /is
    a. Aromatization b. Hydrocracking
    c. Both * d. None

77. Aromatization is
    a. Endothermic * b. Exothermic
    c. Neutral d. None

78. Hydrocracking is
    a. Endothermic b. Exothermic *
    c. Neutral d. None

79. Aromatization takes place in
    a. First reactor * b. Second reactor
    c. Any of the two d. Both

80. __________ gas is supplied to first reactor
    a. Nitrogen b. Hydrogen
    c. Oxygen d. All *

81. Polymerization is
    a. Used to generate heavier hydrocarbons.
    b. Reverse of cracking.
    c. It is a specific conversion process.
    d. All the above *

82. Temperature of polymerization is between
    a. 110-150ºC b. 150-200ºC
    c. 190-230ºC * d. 240-300ºC

83. The pressure during polymerization is (kgf/cm^{2})
    a. 80 b. 85 *
    c. 70 d. 90

84. Which of the following is true about Alkylation
    a. It is a process of combining two molecules.
    b. An Iso-paraffin is combined with Olefin.
    c. The product is chained iso-paraffin.
    d. All the above *

85. The catalyst used in Alkylation is generally
    a. Sulphuric acid b. Hydrofluoric acid
    c. Any of the above * d. None of the above.

86. In gasolene
    a. Aromatic ring is preferred *
    b. Long chained paraffins are preferred.
    c. Olefins are preferred.
    d. None of the above.

87. The process of changing one type of molecule keeping the molecular weight same is called.
    a. Polymerization b. Alkylation
    c. Isomerization * d. None

88. Which of the following is used as catalyst in isomerization ?
    a. Hydrochloric acid b. Aluminium chloride *
    c. Sulphuric acid d. Sodium chloride

89. The temperature during Butane isomerization is generally
    a. 70ºC b. 80ºC
    c. 110ºC * d. 150ºC

90. The pressure during Butane isomerization is generally
    a. 21 kgf/cm2 b. 43 kgf/cm2 *
    c. 58 kgf/cm2 d. 75 kgf/cm2

91. The ideal fuel for spark engine fuels is
    a. Kerosene b. Diesel
    c. Gasolene * d. None of the above.

92. Which of the following is advantage of Gasolene
    a. Higher B.H.P. can be developed *
    b. Slow speed efficiency is more
    c. Less noise pollution.
    d. All the above.

93. The desired properties of fuel for Otto cycle engines is/are
    a. Low boiling point b. High octane rating
    c. Clean burning d. All the above *

94. With higher compression ratio:
    a. The efficiency of Otto cycle increases *
    b. The efficiency decreases.
    c. Any of the above.
    d. None of the above.

95. Octane rating of fuel can be increased by
    a. Increasing the concentration of highly branched iso-paraffin.
    b. By adding terta-ethyl lead.
    c. Both *
    d. None.

96. The grade number of aviation gasolene indicates
    a. Its Octane number b. Its performance number
    c. Either a. or b. * d. None of the above.

97. Which of the following is the desired property of aviation gasolene.
a. High Octane number b. Low boiling point
c. Low freezing point d. All the above *

98. Which of the following can be used as Aviation turbine fuels ?
a. Kerosene * b. Gasolene
c. Lighter gas oil d. All of the above.

99. Which of the following property is not essential for the aviation turbine fuel.
a. High Octane rating *
b. High heating value
c. Low freezing point
d. All the above are essential.

100. In jet engine applications
a. Paraffins and naphthalenes *
b. Olefins are preferred.
c. Aromatics are preferred.
d. Any of the above.

101. Olefins are unsuitable due to
a. High chemical activity
b. Gum forming tendency
c. Both the above *
d. None of the above.

102. CEMILAC is
a. Centre for Military Air worthiness and certification*
b. C-Ethylene Methyl I-L-acetylene compound.
c. Central emission of Military aviation compounds.
d. None of the above.

103. Methodology of CEMILAC includes
a. Audit of Refinery
b. Evaluation of fuel properties.
c. Approval of fuel
d. All the above *

104. Kerosene consists of mainly
a. Paraffins * b. Olefins
c. Aromatics d. Benzenes

105. The height to which flame may be raised before smoke starts, when kerosene is burnt in the standard lamp, is called,
a. Fire point b. Smoke point *
c. Wick point d. None of the above.

106. The char value of Kerosene should be
a. More than 50 mg per kg of kerosene
b. Less than 30 mg per kg of Kerosene *
c. Less than 20 mg per kg of Kerosene
d. Less than 100 mg per kg of Kerosene

107. The deposit on the upper edge of wick is called
a. Jarse b. Char *
c. Tar d. None

108. For a good diesel fuel
a. Delay time is short * b. Delay time is more
c. Delay time varies d. None of the above.

109. Diesel fuels are used in
a. CI Engines * b. SI Engines
c. Any of the above d. None

110. The chief desirable property of the Diesel fuel is
a. High cetane number
b. Freedom from impurities
c. Fairly high flash point
d. All the above *

111. The boiling point of diesel is in the order of
a. 200-370^{o}C b. 350-450^{o}C
c. 450-600^{o}C d. None

112. Ignition temperature of n-paraffins is
a. Less than aromatics b. More than aromatics *
c. Same as aromatic d. None of the above.

113. In diesel fuels.
a. Straight chain hydrocarbons are preferred *
b. Branched chain hydrocarbons are preferred.
c. Aromatics are preferred.
d. None of the above.

114. Which of the following is not oil type
a. No. 1 Oil b. No. 2 Oil
c. No. 3 Oil * d. No. 4 Oil

115. Which of the following is not the advantage of gaseous is fuels
a. Clean burning b. Complete combustion
c. Control is easy d. Easy in storing *

116. The gaseous fuels are
a. Natural gas b. Manufactured gas
c. Either (a) or (b) * d. None of the above.

117. Natural gas is found at
a. Petroleum deposits b. Coal deposits
c. Gas wells d. All the above *

118. Natural gas contains
a. Methane b. Ethane
c. Both * d. None

119. Calorific value of Natural gas is
a. 9000-11000Kal/m3 * b. 12000-15000Kal/m3
c. 15000-17000Kal/m^3 d. None

120. Maximum % of ethane gas in Natural gas can be
a. 30% * b. 15%
b. 10% d. 5%

121. Methane gas is also known as
a. Tube gas b. Fuel gas
c. Marsh gas * d. Light gas

122. Methan gas associated with coal seams is known as
   a. Fire damp * b. Coal gas
   c. Water gas d. All the above.

123. Maximum % of methane in fire damp can be
   a. 80% b. 90% *
   c. 75% d. 60%

124. Manufactured gases are produced from
   a. Coal b. Wood
   c. Peat d. All *

125. The combustible substance in manufactured gas is
   a. Methane b. Carbon monoxid
   c. Hydrogen d. Any of the above *

126. L.P.G. contains
   a. Propane b. Butane
   c. Both * d. None

127. The by product obtained from the carbonization of wood charcoal is called
   a. Wood gas * b. Marsh gas
   c. Pitch gas d. None

128. Which of the following is achieved by carbonizing?
   a. Coke oven gas b. Coal gas
   c. Wood gas d. All the above *

129. Which of the following gas is produced by gasification of coal?
   a. Producer gas b. Water gas
   c. Blast furnace gas d. All *

130. Producer gas can be produced from
   a. Coke b. Coal
   c. Either (a) or (b) * d. Wood

131. Producer gas is used in industrial furnaces because of
   a. High Calorific value b. Low cost *
   c. Both d. None

132. Blast furnace gas is
   a. Low grade producer gas *
   b. High grade producer gas
   c. Coke oven gas
   d. Peat surface.

133. Blast furnace gas contains
   a. Hydrogen b. Methane
   c. Carbon monoxide * d. All the above.

134. When steam is passed on red hot coke it is called
   a. Tear gas b. Coke gas
   c. Red gas d. Blue water gas *

135. Water gas contains
   a. Carbon Monoxide and hydrogen *
   b. Carbon and Hydrogen Peroxide
   c. Methane and hydrogen
   d. Carbon monoxide, Hydrogen & Oxygen.

136. When Calorific value of water gas is increased it is called
   a. Carbonated water gas
   b. Carburetted water gas *
   c. Hydrogenated water gas
   d. None of the above.

137. Fuel used in GARUD Aircraft is
   a. RT fuel b. PG fuel *
   c. ST fuel d. DN fuel.

■■■

CHAPTER - 111
LUBRICANTS

1. The material used between two surfaces to reduce friction is called
   a. Oil   b. Lubricant *
   c. Greese   d. None

2. For piston engines ___________ are used as lubricants
   a. Petroleum oils *   b. Mineral based oils
   c. Coal based oils   d. Water based oils

3. For turbojet engines ___________ are used as lubricants.
   a. Petroleum based oils   b. Mineral based oils *
   c. Coal based oils   d. Water based oils

4. What is the correct sequence of refining processes for lubricants?
   a. Selection, Blending, Processing, Distillation
   b. Selection, Blending, Distillation, Processing.
   c. Selection, Processing, Distillation, Blending *
   d. Selection, Distillation, Processing, Blending

5. The temperature at which the oil releases enough vapour at its surface to ignite when an open flame is applied
   a. Fire point   b. Flash point *
   c. Pour point   d. None

6. The temperature at which the vapours are released rapidly to support combustion is called
   a. Flash point   b. Fire point *
   c. Pour point   d. None

7. High viscosity oils have
   a. High flash point *   b. Low flash point
   c. Low fire point   d. None

8. The lowest temperature at which it will start flowing without disturbance under prescribed conditions is called,
   a. Flash point   b. Pour point *
   c. Fire point   d. None

9. The measure of non combustible constituents of oil is
   a. Flash point   b. Sulphated Ash *
   c. Sulphur content   d. None of the above.

10. The ratio of densities of a substance to the density of water at 4^{o}C is called.
    a. Density
    b. Specific weight *
    c. Specific gravity
    d. None of the above.

11. Which of the following is true for viscosity
    a. It is a factor of formation of lubricating films.
    b. It affects heat generation in bearings
    c. It governs scaling effect of oils.
    d. All the above *

12. The viscosity of oils
    a. Increases with temperatures
    b. Decreases with temperatures *
    c. Remains const
    d. Cannot say.

13. TOST is
    a. Turbine oil stability test *
    b. Two oil straight tank
    c. Oxidation test
    d. None of the above.

14. Which of the following is a performance test ?
    a. Thermal stability test   b. Foam test
    c. Rust protection test   d. All the above *

15. The property of a body to resist decomposition at high temperatures
    a. Anti-wear   b. Corrosion resistance
    c. Thermal stability *   d. All the above.

16. To determine the emulsion and demulsion characteristics of lubrication, _________ test is used
    a. ASTMD1401   b. ASTMD 2711
    c. ASTMIP 1019   d. All the above *

17. Which of the following lubrication is used as circulation oil ?
    a. Polyglycol   b. SHF
    c. Organic Ester   d. All the above *

18. Which of the lubricants is used as Gear lubricant
    a. Polyglycol *   b. Ester
    c. Phosphate Ester   d. All the above.

19. Which of the following is used as Brake fluids ?
    a. SHF   b. Polyglycols *
    c. Organic Ester   d. All the above.

20. In aviation, the Gas turbines uses ___________ as lubricants
    a. Organic Ester *   b. SHF
    c. Silicons   d. All the above.

21. Which of the following is not a property of SHF
    a. High temperature
    b. Low temperature fluidity
    c. Oils and Paints
    d. Solvency *

22. Which of the following is not the advantage of organic esters ?
    a. High temperature stability
    b. Seal compatibility *
    c. Long life
    d. Solvency

23. Which of the following is not the limitation of organic esters?
    a. High temperature stability *
    b. Seal compatibility
    c. Anti wear & Extreme pressure
    d. Low Paint compatibility.

24. Which of the following is the advantage of phosphate esters over mineral oil ?
    a. Fire resistant * b. Low viscosity index
    c. Metal corrosion d. All are advantages

25. Which of the following is not the disadvantage of Polyglycols ?
    a. Paint compatibility
    b. High viscosity index *
    c. Oxidation stability
    d. Less mineral oil compatibility.

26. Olefin Oligomers are also called
    a. Poly-oligomers b. Poly-a-olefins *
    c. Poly-acroparaffins d. None of the above.

27. Polymerisation of 8 to 10 molecules of ethylene is called
    a. Decamerization b. Do deca polymerisation
    c. Oligomerization * d. Ten-polymerisation

28. Olefin Oligomers are widely used as
    a. Industrial Lubricants b. Automotive lubricants*
    c. Aviation lubricants. d. All the above.

29. Alkylation process of Benzene involves joining to the
    a. Molecules of substituent alkyl group *
    b. Molecules of Olefins.
    c. Molecules of chloro group.
    d. None of the above.

30. Which of the following is not a property of Alkylated aromatics.
    a. Low temperature fluidity
    b. Low pour point
    c. Stable to oxidation.
    d. Highly volatile *

31. Alkylated aromatics are used as the
    a. Base fluid in engine oils
    b. Base fluid in gear oils
    c. Greases
    d. All the above *

32. Lower molecular weight polybutenes
    a. Have lubricating properties *
    b. Are used as VI improvers and thickeners
    c. Both the above.
    d. None.

33. The major use of polybutenes is
    a. As gear oils
    b. As electrical insulating oils *
    c. As turbine oils.
    d. All the above.

34. The polybutenes is used as
    a. Cable oils
    b. Liquid dielectrics
    c. Impragnants for capacitors
    d. All the above *

35. The main current application for the cyclo aliphatics is
    a. In stepless, variable speed drives
    b. In roller bearings
    c. Both the above *
    d. None of the above.

36. The base for aircraft jet engines lubricants are:-
    a. Cycloaliphatics b. Polybutenes
    c. Aromatics d. Organic ester *

37. The two types of organic esters in use are :
    a. Bibasic acid esters and polyesters *
    b. Diol & Poly basic esters.
    c. Tripple Matic & Phenol esters.
    d. Diol and polyol esters.

38. Which of the following is not the property of organic esters.
    a. They have excellent low temperature fluidity.
    b. They have low viscosity index *
    c. They have low pour point.
    d. Their products are shear stable.

39. Which of the following is false.
    a. The hydraulic stability of diesters is inferior to that of Mineral oils.*
    b. Mineral oils have good lubricating properties than diesters.
    c. Diesters have good thermal and oxidation stability than mineral oils.
    d. Diesters have lower volatility than mineral oils.

40. When Alcohol reach with two or more hydroxyl groups, them
    a. Dibasic esters are formed.
    b. Polyol esters are formed *
    c. Cycloaliphatics are formed.
    d. Olefin oligomers are formed.

41. Silicones have viscosity index of
    a. 200 b. 150
    c. 300 * d. 400

42. Which of the following is true about silicone ?
    a. They have high viscosity index
    b. They have low pour point.
    c. They have low volatility.
    d. All the above *

43. Major disadvantage of silicones is
    a. Low volatility
    b. They have low surface tension *
    c. Their compressibility is higher.
    d. All the above.

44. In the high temperature greases.
    a. Silicones are used * b. Olefins are used
    c. Alcohols are used d. All the above.

45. Which of the following is the property of silicate esters?
    a. They have excellent thermal stability.
    b. Good oxidation properties
    c. Low pour points and volatility
    d. All the above *

46. _____________ are used in small quantities as that transfer fluids and dielectric coolants.
    a. Silicate esters * b. Polyglycols
    c. Alpha-phenol d. All the above.

47. The largest single class of synthetic lubricant bases is
    a. Silicate esters b. Polyglycols *
    c. Olefins d. Polybutanes.

48. Polyglycols have
    a. Good viscosity temp characteristics *
    b. High pour point.
    c. Low thermal conductivity
    d. All the above.

49. ___________ are used in fire resistant hydraulic fluids
    a. Phosphate esters b. Silicate esters
    c. polyglycols * d. All the above.

50. Water diluted lubricants for rubber bearings and joints are made from
    a. Water soluble polyglycols *
    b. Water insoluble polyglycols.
    c. Both
    d. None.

51. _____________ are used as heat transfer fluids, as base in certain types of industrial hydraulic fluids and as high temperature bearing oil.
    a. Water soluble polyglycols.
    b. Water insoluble polyglycols *
    c. Both
    d. None.

52. Which of the following is not a property of phosphate esters ?
    a. Superior fire resistance.
    b. Good lubrication properties.
    c. Fair high temperature stability.
    d. Decomposition products are always non-corrosive*

53. Commercial aircafts generally use _______________ as a base of hydraulic fluids.
    a. Phosphate esters * b. Polyglycols.
    c. Silicate esters d. None of the above.

54. ____________ is used as agent in cooling radars for MIG -23 and Baaz aircraft.
    a. Hico-Antifreeze coolant Grade 65 *
    b. Hico-Antifreeze coolant Grade 2
    c. Hico-Antifreeze coolant Grade 25
    d. Hico-Antifreeze coolant Grade 30

55. Aircraft components are lubricated by ________
    a. HICO Antifreeze coolant Grade 65.
    b. MOSIL TV -54 compound *
    c. MOSIL PM -100
    d. All the above.

56. Which of the following is a property of MOSIL-TV-54 ?
    a. Good corrosion resistance
    b. Good fluidity at service
    c. Acts a sealant
    d. All of the above *

57. _______________ is used on components of R11F series engine.
    a. Hico Antifreeze coolant grade 65.
    b. MOSIL TV -54
    c. MOSIL PM -100 *
    d. None of the above.

58. ___________ is the fine powder of Molybdenum disulphide.
    a. MOSIL TV -54 b. HICO cooling grade 65
    c. MOSIL PM -100 * d. None of the above.

59. What is the maximum percentage of silicon dioxide in MOSIL-PM-100
    a. 0.7% b. 0.3% *
    c. 1.5% d. 2.5%

60. Which is used as the lubricant for the cast iron sealings
    a. MOSIL PM -100 *
    b. HICO cooling grade 65
    c. MOSIL TV -65
    d. None of the above.

61. Flash point of Nycolube-934 is of the order of
    a. 50°C b. 150°C
    c. 190°C * d. 220°C

62. Which of the following is not a property of Nycolube -934.
    a. The flash point is high.
    b. Good performance in the low temp condition of the order of -70°C.
    c. Both are properties *
    d. None of the above.

63. __________ is used in Hydrosystem of MIG -25 air craft.
    a. MOSIL PM 100 b. MOSIL TV -65
    c. Nycolube * d. None of the above.

64. Flash point of oil MK-8P (IB) is of the order.
    a. 70°C b. 125°C
    c. 170°C * d. 215°C

65. The pour point of oil MK-8P (IB) is of the order of
    a. -51°C * b. -65°C
    c. -90°C d. -15°C

66. __________ is used for MIG series of Aircraft engines as lubricating oil.
    a. MOSIL PM 100 b. MOSIL TV -65
    c. Oil MK 8P (IP) * d. None of the above.

67. Flash point of oil OX-14 is of the order of
    a. 220°C * b. 250°C
    c. 320°C d. 350°C

68. The pour point of oil OX-14 is of the order of
    a. -66°C * b. -9½°C
    c. - 5°C d. -25°C

69. Precipitation no of oil OX-14 is
    a. 5 b. 2
    c. 0 * d. 4

70. _____________ is used on aircraft components such as parking brake opportunity handle, flap tab.
    a. MOSIL PM 100 b. OIL OX -14 *
    c. MOSIL TV d. Oil OSB -4.

71. Which of the following is the property of Oil 0584?
    a. Higher pour points
    b. Better viscosity at operating temp.
    c. No corrosive action on the parts in contact with it.
    d. All the above *

72. The flash point of oil OSB -4 is
    a. 200°C b. 100°C
    c. 165°C * d. 340°C

73. Pour point of oil OSB-4 is of the order of
    a. -55°C b. -65°C *
    c. -15°C d. -5°C

74. ___________ is used for reduction gear assembly of autopilot of MIG 21 M aircraft.
    a. Oil OSB -14 b. Oil OSB 4 *
    c. Oil MK-8P (IB) d. Nycolube.

■■■

CHAPTER - 112
GREASES

1. Which of the following is the property of greases
   a. Adequate lubrication for reducing coefficient
   b. To protect against fiction
   c. To act as a seal against dirt and water
   d. All the above *

2. Which of the following is the constituent of greases
   a. Liquid portion b. The thickness
   c. Additives d. All the above *

3. The modifier are added in the grease to
   a. give lubricating effects
   b. to give semi fluid structures
   c. to provide special properties *
   d. none of the above.

4. Most of the greases have ------------ as their fluid components
   a. mineral oils * b. ester oil
   c. water d. asphalts

5. Greases made with mineral oils provide satisfactory performance in
   a. automotive application b. industrial applications
   c. both * d. none .

6. The property that makes silicones suitable as synthetic lubricating fluids is/are
   a. high viscosity index
   b. low pour point
   c. good low temperature fluidity
   d. all the above *

7. Thickness used in grease are normally
   a. water b. metallic soaps *
   c. mineral oils d. all the above.

8. Initially the greases were made of
   a. Calcium soaps * b. Aluminium soaps
   c. Sodium soaps d. Lithium soaps.

9. Modification of metallic soap greases are ....
   a. Calcius greases b. Complex greases *
   c. Alsoli greases d. Neutral greases.

10. The complexing agent may be
    a. Organic b. Inorganic
    c. Either a. or b. * d. none.

11. For high temperature application .... are used as complexing agent.
    a. Bentonite b. Sillical aerogel
    c. Both * d. None.

12. Which of the following is used as the thickness
    a. Polyurea b. Pigment
    c. Dyes d. All the above *

13. Which of the following soaps is not water resistant
    a. Calcium soap b. Sodium soap *
    c. Lithium soap d. Calcium soap

14. The maximum operating temperature for calcium soap is
    a. 15°C b. 25°C
    c. 71°C * d. 93°C.

15. The maximum operating temperature for sodium soap is
    a. 71°C b. 121°C *
    c. 149°C d. 180°C.

16. The maximum operating temperature for Lithium soap is
    a. 71°C b. 121°C *
    c. 149°C d. 180°C.

17. The Calcium Lead soap has maximum operating temperature equal to
    a. 71°C b. 121°C
    c. 149°C * d. 180°C

18. The maximum operating temperature for Calcium Lead soaps is
    a. 71°C b. 121°C
    c. 149°C * d. 180°C.

19. The maximum operating temperature for Lithium Complex is
    a. 71°C b. 121°C
    c. 149°C * d. 180°C.

20. The maximum operating temperature for Inorganic thickness is
    a. 71°C b. 121°C
    c. 149°C * d. 180°C.

21. The principle use of Calcium soaps thickness is in greases used for
    a. Chassis * b. Universal joints
    c. Wheel bearings d. All the above.

22. -------------- soap is used as thickness for the high temperature applications
    a. Calcium soap b. Sodium soap *
    c. Lithium soap d. Lithium complex.

23. The modifiers used in the greases work as
    a. Rust inhibitors
    b. Pour point depressants
    c. Friction reducing agents
    d. All the above *

24. When the load is heavy --------------- is used in greases
    a. Molybdenum * b. Titanium
    c. Plumbum d. All the above.

25. The first step in the process of manufacture of greases is
    a. Milling b. Cut back
    c. Saponification * d. Deaeration.

26. In the saponification process, the soap is
    a. Heated *
    b. Cooled
    c. Kept at room temperature
    d. Depends on the process.

27. The thin film of grease is exposed to vacuum in --------------------- step
    a. Milling b. Cut back
    c. Saponification d. De aeration *

28. The final step in the manufacture of grease is
    a. Cut back b. Milling
    c. De aeration d. Filtering *

29. The properties of grease depend on
    a. Amount of thickness b. Colour & texture
    c. Structure d. All the above *

30. Consistancy is
    a. Measure of hardness or softness of grease *
    b. Ability to deform
    c. Working of grease at constant temperature
    d. All the above.

31. High cone penetration indicates
    a. Harder grease b. Softer grease *
    c. Clean grease d. Soapish grease

32. The cone penetrations for cone test are measured at
    a. 10°C
    b. 0°C
    c. 25°C *
    d. no specified temperature.

33. The fluids for which the flow rate is directly proportional to the shear stress are called
    a. Newtonian fluids * b. Non Newtonian fluids
    c. Pseudo plastics d. Plastics

34. Grease is a
    a. Newtonian fluids
    b. Non - Newtonion fluids *
    c. Plastic
    d. None of the above.

35. The temperature at which the drop of material falls from the orifice test cup under specified conditions is called
    a. Pour point b. Viscous point
    c. Dropping point * d. None of the above.

36. The test procedures for measuring dropping points are/is
    a. ASTM D 566 b. ASTM D 2265
    c. both * d. none.

37. ASTM D 566 is used to measure dropping points up to
    a. 150°C b. 177°C *
    c. 260°C d. 330°C

38. ASTM D 2265 is used to measure dropping points up to
    a. 150°C b. 177°C
    c. 260°C d. 330°C *

39. Mechanical stability is the ability of the grease to resist changes in
    a. Consistancy * b. Oxidation properties
    c. Separation oil d. None of the above.

40. Resistance to oxidation is required in ------------- bearings
    a. Thrust b. Journal
    c. Roller * d. None.

41. When organic acids get generated, the lubricants get
    a. Acidic b. Basic
    c. Water d. Salty *

42. Oxidation stability of lubricating greases is measured by the
    a. Oxygen bomb method *
    b. Hydrogen bomb method
    c. Bomb calorimeter
    d. None of the above.

43. Oxygen stability under dynamic conditions for lubricants is determined by ------------ test
    a. ASTM 0336 b. ASTM D 566
    c. ASTM D 3336 * d. ASTMD 2566

44. Greases are used for
    a. Rolling element bearing
    b. Thin film plain bearings
    c. Slides
    d. All the above *

45. IL -G -2116 used ------------ as thickness
    a. Lithium soap * b. Clay
    c. Non soap d. None of above.

46. AIR 4222 uses ----------- as thickner
    a. Lithium soap b. Clay *
    c. Non soap d. None of the above.

47. The operation temperature for AIR 4210 is -------------
a. - 73°C to 121°C * b. - 54° to 147°C
c. -55°C to 100°C d. -65°C to 65°C.

48. The operation temperature for IL - G - 2116 is in
a. -25°C to 75°C b. - 30°C to 30°C
b. -73°C to 121°C * d. - 65°C to 65°C.

49. The operating temperature for DEPSTAN 91 - 57 is
a. - 73°C to 121°C * b. -54°C to 177°C
c. -65°C to 216°C d. -65°C to + 65°C.

50. The operating temperature for AIR 4222 grease is
a. - 73°C to 121°C b. -54°C to 177°C *
c. -65°C to 216°C d. -65°C to + 65°C.

51. The base oil for AIR 4210 is
a. Synthetic diester *
b. Diester
c. Mineral oil
d. Polyol ester.

52. The base oil for IL - G 2116 is
a. Synthetic diester *
b. Synthesized hydrocarbon
c. Mineral oil
d. None of the these.

53. The base oil for AIR 4222 is
a. Synthetic duster
b. Synthesized hydrocarbon
c. Synthetic polyol ester *
d. None of these.

54. Which of the following is not a property of clatin (M)
a. This has good performance
b. High drop points
c. Good corrosion resistance *
d. All the above.

55. Clatin 221(M) is used for
a. Lubrication of piston assembly of wheel brake
b. Lubrication of control rods
c. Lubrication of radar control systems
d. All the above *

56. --------------- grease is used mainly as sealant for a/c parts
a. Clatin 221 (M)
b. DOW CORNING 93 - 076 *
c. Grease AMS - 3
d. All the above.

57. Which of the following is true for grease AMS -3
a. It has drop point of 150°C
b. Good corrosion resistance when in 100% humidity weather
c. both *
d. none of the above

58. ---------------- is used for greasing of bolts and mechanism working in water
a. Clatin 221 (M)
b. DOW CORNING 93 - 076
c. Grease AMS - 3 *
d. All the above.

59. Which of the following is the property of DMSRDE grease VNINP - 282
a. It is a lubrication grease
b. It has a good corrosion resistance
c. Good colloidal stability temperatures
d. All the above *

60. ----------------- is used for joint pipe lines of oxygen system, for the frictional parts of light GSH filter etc.
a. Clatin 221(M)
b. Grease AMS - 3
c. DMSRDE Grease VNINP - 282 *
d. All the above.

61. The drop point of Grease OKB - 122-7 (B) is of order
a. 150°C b. 200°C *
c. 300°C d. 350°C.

62. Which of the following is a property of OKB -122-7 (B)
a. Good Corrosion resistance
b. Low evaporation
c. Low percent of oil separation
d. All the above *

63. ---------------- is used as lubrication grease in Gyro Transmitter 458 M and Gun Camera 45 - 1- 100 - OC etc.
a. Servo grease NK- 50
b. OKB - 122 - 7 (B) *
c. Clatin - 221 (M)
d. Grease AMS - 3

64. Which of the following is not a property of NK -50
a. Its high drop point of 200°C
b. High corrosion resistance
c. Low percentage of oil separation at operation temperature
d. all of the above *

65. ------------------- is used for lubrication of main wheel and nose wheel bearings of MIG aircraft
a. Servo grease NK-50 *
b. OKB - 122.7 (B)
c. Clatin - 221 (M)
d. Grease AMS-3

66. Water content in NK 50 is
a. absent b. 0.5% max
c. 0.03% max * d. 9%.

67. Water content in Grease OKB-122-7(B)
a. absent * b. 0.5% max
c. 0.03% max d. 0.9% max.

68. Water content in Grease AMS- 3 is
    a. absent * b. 0.5% max
    c. 0.03% max d. 0.9% max.

69. Water content in Clatin - 221 (M) is
    a. absent * b. 0.5% max
    c. 0.03% max d. 0.9% max.

70. Grease XG- 271 is
    a. Graphite based
    b. Mineral oil based *
    c. Petroleum oil & gelling agent
    d. None of the above.

71. Grease BU contains
    a. Petroleum oil with gelling agent
    b. Silicon fluid and gelling agent *
    c. Synthetic oil and gel agent with additives
    d. None.

72. Drop point of clatin 221 is of the order of
    a. 221°C b. 17°C
    c. 270°C * d. 350°C.

■■■