School of Aeronautics(Neemrana)

I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan

Fortnightly/Term : Mid Term -1 Date : 24. 02. 2018

Subject : **Engg. Mathematics - II (Th)** Batch : AE-12,13,14 & MT-3

Faculty Name : Mr. Pankaj Kumar Tomar Semester: II

(Answer any FIVE Questions. All Questions carry equal marks) **Total Marks: 45**

Q.No.	Questions	Unit Name / Topic
1.	Tes t he following system of equation passess a no trivial solution: $x_1+x_2+2x_3+3x_4 = 0$ $3x_1+4x_2+7x_3+10x_4 = 0$ $5x_1+7x_2+11x_3+17x_4 = 0$ $6x_1+8x_2+13x_3+16x_4 = 0$ (9)	Unit No.: Topic Name: Source:
2.	For what values of k, the equations $x+y+z = 1$, $2x+y+4z= k$, $4x+y+10z = k^2$ have a solution and solve them completly in each case. (9)	Unit No.: Topic Name: Source:
3.	Find the Eigen value and Eigen vectors of the matrix $A = \begin{vmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{vmatrix}$ (9)	Unit No.: Topic Name: Source:
4.	Find the characteristic equation of the matrix $A = \begin{vmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{vmatrix}$ and hence Compute A^{-1} also find the matrix represented by $A^8-5A^7+7A^6-3A^5+A^4-5A^3+8A^2-2A+I$ (9)	Unit No. Topic Name: Source:

Q.No.	Questions	Unit Name / Topic
5.	Reduce the matrix $A = \begin{vmatrix} -1 & 2 & -2 \\ 1 & 2 & 1 \\ -1 & -1 & 0 \end{vmatrix}$ to a diagonal form. (9)	Unit No.: Topic Name: Source:
6.	Solve the following diff. equation- i) $(1+y^2)\,dx = (\tan^{-1} y - x)\,dy$ ii) $(y \log y)\,dx + (x - \log y)\,dy = 0$ (9)	Unit No.: Topic Name: Source:
7.	Solve $\frac{dy}{dx} = \frac{1}{xy(x^2 y^2 + 1)}$ (9)	Unit No.: Topic Name: Source:
8.	Solve $(1 + e^{x/y})\,dx + e^{x/y}\left(1 - \frac{x}{y}\right)dy = 0$ (9)	Unit No. Topic Name: Source:

School of Aeronautics (Neemrana)

I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan

MODEL ANSWER PAPER

Name of Examination: MID TERM-01 Date of Examination: 24.02.2018

Subject Engg Mathematics-II Batch 12, 13, 14 Semester II

MT-03

Q. NO.	ANSWER	MARKS

1. The given system is a homogeneous linear system of the form $AX = 0$

Coefficient Matrix

$$A = \begin{bmatrix} 1 & 1 & 2 & 3 \\ 3 & 4 & 7 & 10 \\ 5 & 7 & 11 & 17 \\ 6 & 8 & 13 & 16 \end{bmatrix}$$

Operating $R_{21}(-3)$, $R_{31}(-5)$, $R_{41}(-6)$

$$\sim \begin{bmatrix} 1 & 1 & 2 & 3 \\ 0 & 1 & 1 & 1 \\ 0 & 2 & 1 & 2 \\ 0 & 2 & 1 & -2 \end{bmatrix}$$

$R_{32}(-2)$, $R_{42}(-2)$

$$\sim \begin{bmatrix} 1 & 1 & 2 & 3 \\ 0 & 1 & 1 & 1 \\ 0 & 0 & -1 & 0 \\ 0 & 0 & -1 & -4 \end{bmatrix}$$

$R_{43}(-1)$

$$\sim \begin{bmatrix} 1 & 1 & 2 & 3 \\ 0 & 1 & 1 & 1 \\ 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & -4 \end{bmatrix}$$

Q. NO.	ANSWER	MARKS

$\therefore \rho(A) = 4 \; (= \text{No of Variables})$

Hence the given homogeneous System of Equation has trivial solution.

$x_1 = 0, \; x_2 = 0, \; x_3 = 0$ and $x_4 = 0$

2

Augmented matrix

$$[A:B] = \left[\begin{array}{ccc|c} 1 & 1 & 1 & 1 \\ 2 & 1 & 4 & K \\ 4 & 1 & 10 & K^2 \end{array}\right]$$

Operating $R_{21}(-2)$, $R_{31}(-4)$, $R_{32}(-3)$

$$\sim \left[\begin{array}{ccc|c} 1 & 1 & 1 & 1 \\ 0 & -1 & 2 & K-2 \\ 0 & 0 & 0 & K^2-3K+2 \end{array}\right]$$

If the given system has solutions, then

$K^2 - 3K + 2 = 0 \Rightarrow K = 1, 2$

Case-1 When $K = 1$ we have

$x + y + z = 1 \quad \textcircled{1} \Rightarrow -y + 2z = -1 \quad \textcircled{2}$

Let $y = K$ Then $z = \frac{K-1}{2}$

from $\textcircled{1}$ $x + K + \frac{K-1}{2} = 1 \Rightarrow x = \frac{3}{2}(1-K)$

$\Rightarrow x = \frac{3}{2}(1-K), \; y = K, \; z = \frac{K-1}{2}$, K is arbitra

Case-2 When $K = 2$, we have —

$x + y + z = 1, \quad \textcircled{3} \Rightarrow -y + 2z = 0 \quad \textcircled{4}$

Let $z = \lambda$ Then from $\textcircled{4}$ $y = 2\lambda$

$x = 1 - 3\lambda \Rightarrow x = 1 - 3\lambda, \; y = 2\lambda, \; z = \lambda$, is arbitrary

Q. NO.	ANSWER	MARKS

3. The characteristic equation is

$$|A-\lambda I|=0$$

$$\begin{vmatrix} 8-\lambda & -6 & 2 \\ -6 & 7-\lambda & -4 \\ 2 & -4 & 3-\lambda \end{vmatrix}=0$$

After expanding

$\Rightarrow -\lambda^3+18\lambda^2-45\lambda=0 \Rightarrow \lambda=0, 3, 15$

The Eigen vector corresponding to $\lambda_1=0$ is given

$(A-\lambda_1 I)X_1=0$ where $X_1=\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$

$$\Rightarrow \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}=\begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$

$\Rightarrow 8x_1-6x_2+2x_3=0$ — ①
$-6x_1+7x_2-4x_3=0$ — ②
$2x_1-4x_2+3x_3=0$ — ③

After solving ① & ②, $x_1=K_1$, $x_2=2K_1$, $x_3=2K_1$

$$X_1=K_1\begin{bmatrix} 1 \\ 2 \\ 2 \end{bmatrix}$$

Eigen vector X_2 corresponding to $\lambda_3=3$ is given

$$\begin{bmatrix} 5 & -6 & 2 \\ -6 & 4 & -4 \\ 2 & -4 & 0 \end{bmatrix}\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}=\begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$

$5x_1-6x_2+2x_3=0$
$-6x_1+4x_2-4x_3=0$
$2x_1-4x_2=0$

$x_1=2K_2$, $x_2=K_2$, $x_3=-2K_2$

$$X_2=K_2\begin{bmatrix} 2 \\ 1 \\ -2 \end{bmatrix}$$

Eigen Vector X_3, corresponding to $\lambda_3=15$ is

Q. NO.	ANSWER	MARKS

$(A-\lambda_3 I)X_3 = 0$, $X_3 = \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$

$$\begin{bmatrix} -7 & -6 & 2 \\ -6 & -8 & -4 \\ 2 & -4 & -12 \end{bmatrix}\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$

$-7x_1 - 6x_2 + 2x_3$

$-6x_1 - 8x_2 - 4x_3 = 0$

$2x_1 - 4x_2 - 12x_3 = 0$

$x_1 = 2k_3$, $x_2 = -2k_3$, $x_3 = -k_3$ $\quad X_3 = k_3\begin{bmatrix} 2 \\ -2 \\ 1 \end{bmatrix}$

4 The Chara. Equation of A is

$$|A-\lambda I| = 0 \quad \begin{vmatrix} 2-\lambda & 1 & 1 \\ 0 & 1-\lambda & 0 \\ 1 & 1 & 2-\lambda \end{vmatrix} = 0$$

$\lambda^3 - 5\lambda^2 + 7\lambda - 3 = 0$

By CHT : $A^3 - 5A^2 + 7A - 3I = 0$ — (1)

Pre Multiply (1) A^{-1} is

$A^2 - 5A + 7I - 3A^{-1} = 0$

$A^{-1} = \frac{1}{3}(A^2 - 5A + 7I)$.

$A^2 = \begin{bmatrix} 5 & 4 & 4 \\ 0 & 1 & 0 \\ 4 & 4 & 5 \end{bmatrix} \Rightarrow A^{-1} = \frac{1}{3}\begin{bmatrix} 2 & -1 & -1 \\ 0 & 3 & 0 \\ -1 & -1 & 2 \end{bmatrix}$

$A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I$

$A^5(A^3 - 5A^2 + 7A - 3I) + A(A^3 - 5A^2 + 7A - 3I) + A^2 + A + I$

$= A^2 + A + I$

$$= \begin{bmatrix} 5 & 4 & 4 \\ 0 & 1 & 0 \\ 4 & 4 & 5 \end{bmatrix} + \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix} + \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 8 & 5 & 5 \\ 0 & 3 & 0 \\ 5 & 5 & 8 \end{bmatrix}$$

Q. NO.	ANSWER	MARKS
5	$\lvert A-\lambda I\rvert = \begin{vmatrix} -1-\lambda & 2 & -2 \\ 1 & 2-\lambda & 1 \\ -1 & -1 & -\lambda \end{vmatrix} = 0$	

$\lambda^3 - \lambda^2 - 5\lambda + 5 = 0$

$\lambda = 1, \pm\sqrt{5}$

When $\lambda = 1$, the corresponding eigen vector is given by $-2x_1 + 2y_1 - 2z_1 = 0$

$x_1 + y_1 + z_1 = 0$

$x_1 - y_1 + z_1 = 0$

Eigen Vector $X_1 = K_1 \begin{bmatrix} 1 \\ 0 \\ -1 \end{bmatrix}$

When $\lambda = \sqrt{5}$ the Corresponding eigen vectors is given by

$$\frac{x_1}{6-2\sqrt{5}} = \frac{y_1}{-1+\sqrt{5}} = \frac{z_1}{1-\sqrt{5}} \qquad X_2 = K_2 \begin{bmatrix} \sqrt{5}-1 \\ 1 \\ -1 \end{bmatrix}$$

Similarly the eigen vector corresponding $\lambda = -\sqrt{5}$ is $X_3 = K_3 \begin{bmatrix} \sqrt{5}+1 \\ -1 \\ 1 \end{bmatrix}$

The Modal Matrix $M = \begin{bmatrix} 1 & \sqrt{5}-1 & \sqrt{5}+1 \\ 0 & 1 & -1 \\ -1 & -1 & 1 \end{bmatrix}$

$D = \begin{bmatrix} 1 & 0 & 0 \\ 0 & \sqrt{5} & 0 \\ 0 & 0 & -\sqrt{5} \end{bmatrix}$ is a diagonal Matrix

6(i)

$$\frac{dx}{dy} + \frac{x}{1+y^2} = \frac{\tan^{-1}y}{1+y^2} \Rightarrow P = \frac{1}{1+y^2},\ Q = \frac{\tan^{-1}y}{1+y^2}$$

$I.F = e^{\int P\,dx} = e^{\tan^{-1}y}$

$x \cdot (I.F) = \int (Q \cdot I.F)\,dy + c$

$x\, e^{\tan^{-1}y} = (\tan^{-1}y - 1)\, e^{\tan^{-1}y} + c$

$x = \tan^{-1}y - 1 + c e^{\tan^{-1}y}$

Q. NO.	ANSWER	MARKS
6(ii)	$\frac{dx}{dy} + \frac{x}{y\tan y} = \frac{1}{y}$ is a linear diff. Equation $\frac{dx}{dy} + Px = Q \quad P = \frac{1}{y\log y}, \quad Q = \frac{1}{y}$ $\therefore I.F = e^{\int P dy} = e^{\int \frac{1}{y\log y} dy} = e^{\log(\log y)} = \log y$ $x \cdot \log y = \int \frac{1}{y} \cdot \log y \, dy + c$ $x \log y = \frac{1}{2}(\log y)^2 + c$, c is arbitrary	
7	$\frac{dx}{dy} = x^3y^3 + xy \Rightarrow \frac{dx}{dy} - xy = x^3y^3$ dividing by $x^3 \Rightarrow \frac{1}{x^3}\frac{dx}{dy} - \frac{y}{x^2} = y^3$ put $u = -1/x^2 \Rightarrow \frac{2}{x^3}\frac{dx}{dy} = \frac{du}{dy}$ $\frac{1}{2}\frac{du}{dy} + uy = y^3$ $\frac{du}{dy} + 2uy = 2y^3$, which is linear $I.F = e^{\int 2y\,dy} = e^{y^2}$ $u \cdot e^{y^2} = \int 2y^3 e^{y^2} dy + c$ put $y^2 = t \Rightarrow 2y\,dy = dt$ $\Rightarrow -1/x^2 = (y^2 - 1) + ce^{-y^2}$	

Q. NO.	ANSWER	MARKS
8		

The given equation can be written as

$$\frac{dx}{dy} = -\frac{e^{x/y}(1 - x/y)}{(1 + e^{x/y})}$$

$$x = vy \Rightarrow \frac{dx}{dy} = v + y\frac{dv}{dy}$$

$$v + y\frac{dv}{dy} = \frac{e^{-v}(1-v)}{(1+ev)}$$

$$y\frac{dv}{dy} = \frac{e^{v}(1-v)}{1+e^{v}} - v$$

$$y\frac{dv}{dy} = \frac{-e^{v} + ve^{v} - v - ve^{v}}{1+ev} = -\frac{(e^{v}+v)}{1+ev}$$

$$\frac{(1+ev)\,dv}{(v+ev)} = -\frac{dy}{y}$$ on integrating

$$\boxed{x + y\,e^{x/y} = c}$$

Note

1. Paper Setter is required to carefully write the answers for the questions, after consulting all the relevant books.
2. For any discripencies found in answers, paper setter will be held responsible for playing with the career of the students,and doing breach of trust with them, and accordingly action can be taken by the disiplinary committee in this regard.
3. Principal before signing for the correctness of the answer shall ensure the same from relevant books. Point No. 1 & 2 above are applicable to Principal also in case any discripencies are found in answers.

Dated 22/02/2018 **Signature of Paper Setter** **Signature of Principal/HOD**

Annexure No. SA/14

School of Aeronautics(Neemrana)

I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan

Fortnightly/Term : Mid Term -1 Date : 24. 02. 2018

Subject : **Human Value (Th)** Batch : AE-12 &14

Faculty Name : Ms. Ambika Semester: II

(Answer any FIVE Questions. All Questions carry equal marks) **Total Marks: 45**

Q.No.	Questions	Unit Name / Topic
1.	'I' is a conscious unit while the body is a material unit. Examine this statement. (9)	Unit No.: Topic Name: Source:
2.	Differentiate between the activities of knowing, assuming, recognizing and fulfillment with one example. (9)	Unit No.: Topic Name: Source:
3.	Discuss the problems that are created by having desire, thoughts and expectation on the basis of pre conditioning. (9)	Unit No.: Topic Name: Source:
4.	What do you mean by value education? What is the need for value education? (9)	Unit No. Topic Name: Source:

Q.No.	Questions	Unit Name / Topic
5.	What do you mean by natural acceptance? Is it innate, invariant and universal? Explain. (9)	Unit No.: Topic Name: Source:
6.	Write short notes on the following : Swatva, Swatantrata , swarajya, SVDD , SSDD , SSSS (9)	Unit No.: Topic Name: Source:
7.	The needs of the self are qualitative and the needs of the body are quantitative. Illustrate. (9)	Unit No.: Topic Name: Source:
8.	Define self-exploration. Explain the process with a diagram. (9)	Unit No. Topic Name: Source:

Annexure No. SA/35

School of Aeronautics (Neemrana)

I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan

MODEL ANSWER PAPER

Name of Examination: Mid Term - 1 Date of Examination: 27.02.2018

Subject Human Values Batch 12 & 14 Semester II

Q. NO.	ANSWER	MARKS
Ans. 1.	There is the familiar shape and structure of a human being that is immediately apparent to us and we imagine someone with similar human body-like features. But in addition to the body, there is also the aliveness of the person the entity that keeps the body 'alive' and makes it operate in various ways. We perceive this aliveness in the activities demonstrated by the person like their seeing, talking, listening, walking, and eating, etc. This aliveness is called Jivana. Thus, a human being is coexistence of the body and jivan. This jivan refers to itself as 'I' (self). Thus we say "I am so and so" or "I feel tired" or "I am happy" and not "my body is happy". This I or self is also called 'consciousness' and is the sentient constitute of the human being. The human being is the sum total of sentiments and physical aspect, the self ('I') and the body, and there is exchange of information between the two, i.e. 'I' and body exist together and are related. There is a flow of information from 'I' to the body and from body to the 'I'. We can make this distinction between the self and the body in three ways in terms of the needs, activities and the types of these two entities. All the needs of I, say respect, trust, etc., can be called as Happiness (such), while the needs of body are physical facilities (suvidha) like food. The two things are qualitatively different. There is no relevance of quantity for the needs of I as it is qualitative, while the needs of body are quantitative, and they are limited in quantity. The activities of 'I' are activities like, desire, thinking, selection, while the activities of body are activities like eating, breathing etc. The mode of interaction of 'I' includes knowing, assuming, recognizing and fulfilment. The fulfilment depends on recognition depends on assumptions and assumptions depends on knowing or not knowing (beliefs). If assuming is based on knowledge, then recognition will be correct and fulfilment will be correct. If assuming is not based on knowledge, then things may go wrong. The mode of interaction of body is only recognizing and fulfilling. Self is a conscious entity and the body is a material entity, or physicchemical in nature. To conclude we can say that the human being can be understood in terms of a co-existence of two entirely distinct entities, namely sentient 'I' and material body. Their needs and activities are quite different and have to be understood accordingly. But these two constituents of human being are to act in close synergy with each other.The human being is the co-existence of 'I' and the body, and there is exchange of information between the two, i.e. 'I' and body exist together and are related. There is a flow of information from 'I' to the body and from body to the 'I'. We can make this distinction between the self and the body in three ways in terms of the needs, activities and the types of these two entities.	

Q. NO.	ANSWER	MARKS
	All the needs of I, say respect, trust, etc., can be called as Happiness (such), while the needs of body are physical facilities (suvidha) like food. The two things are qualitatively different. There is no relevance of quantity for the needs of I as it is qualitative, while the needs of body are quantitative, and they are limited in quantity. Human beings are a complex combination of the sentiment 'I' which relates to all the feelings and the material 'body' which refers to all the physical facilities available to them. Need of self is sukh (happiness). Sukh is qualitative. Therefore the needs of 'I' are qualitative. They are not quantifiable. We also want them continuously. We cannot talk of one kg of respect or one meter of happiness. Our feelings are qualitative. Either they are or they are not. Ex. Happiness is qualitative. Either we are feeling happy or we are not. Also ifa feeling is not naturally acceptable; we do not want it even for a single moment. If acceptable, we want it continuously. We can see this with the example of respect. We don't want the feeling of disrespect even for a single moment, since it is not naturally acceptable to us. By nature man is fond off comfort and happiness so he goes on making desires and ambitions one after the other to enjoy more in life. To lead a comfortable life he also accumulates many facilities, so that his life may become full of comfort and happiness. Sukh depends upon our thinking, so many times we are surrounded by materialistic possessions but we feel unsatisfied. People think that their happiness depends upon suvidha (facilities) but is it not so; happiness depends upon our thinking or our mental satisfaction. Need of body are physical facilities. Physical facilities are needed for the body in a limited quantity. When we try and exceed these limits, it becomes troublesome for us after some time. Let's take the example of eating. As far as, physical facilities (say rasgulla) go, they are necessary in the beginning, but if we keep consuming, it becomes intolerable with the passage of time. This applies to every physical facility. We can only think of having unlimited physical facilities, but if we try and consume, or have too much of physical facilities, it only ends up becoming a problem for us. When we try to perpetuate physical facilities, the following pattern results. With time it successively changes from: Necessary and tasteful Unnecessary but tasty Unnecessary and tasteless Intolerable!	
Ans 2.	If we look at the variety of activities that we are engaged in commonly - we see that we can put them in three categories: 1. Activities that are going on in the self 2. Activities that are going on in the body 3. Activities involving both the self and the body Knowing, assuming, recognizing and fulfilling are the activities involving both the self and the body.	

Q. NO.	ANSWER	MARKS
	Activities of recognizing and fulfilling in the body: Apart from the activities of Breathing, Heartbeat, Digestion etc., the activities of the body can also be understood as recognition and fulfilment. In fact, the mutual interaction between any two material entities can be understood as recognition and fulfilment of their relationship. For example when we are thirsty and drink water, the body absorbs the water to the extent needed and uses for the nourishment of the various organs. Here, body recognizes its relation with water and fulfils it. Recognizing Fulfilling. **Activities of knowing, assuming, recognizing and fulfilling in the self ('I'):** When it comes to self (jivan or 'I'), which is a conscious entity; in addition to 'recognizing and fulfilling', there is also the activity of assuming and that of knowing. In fact, recognizing and fulfilling in case of human beings will depend upon knowing and/or assuming. a. **We assume -** We all make assumptions and our response (recognition and fulfilment) is dependent on the assumption. For ex.: If I see a snake and assumed it to be a rope, I shall respond differently to it, than if I take it to be a snake itself. We call this activity 'assuming or mannana'. b. **We recognize -** We all recognize things today, we recognize a variety of things. Like, we recognize water, our parents, friends, etc. We call this activity 'recognizing or pahachaanana'. The recognizing in 'I' depends on assuming. c. **We fulfil -** The response that follows recognition is called the activity of 'fulfilling or nirvahakarna'. The fulfilment depends on the recognition. For ex.: Once we recognize water, we take it. Taken together we can write it as (in I): Assuming Recognizing Fulfilling There is another activity that exists in us (in 'I'). This activity is called 'knowing'. Knowing means we have the right understanding - the understanding of harmony at all levels of our living. When we have the right understanding, when we have the knowledge of reality, it is definite, and then assuming becomes according to the knowing, and hence recognizing and fulfilling becomes definite, or according to knowing. Until then, it is subject to beliefs and assumptions, and these keep changing. When we list these down; Knowing Desiring, thinking etc.Breathing, heartbeat, etc. Activities are : Knowing, assuming, Recognizing, fulfilling. The activities of 'I' are activities like, desire, thinking, selection, while the activities of body are activities like eating, breathing etc. The mode of interaction of 'I' includes knowing, assuming, recognizing and fulfilment.	

Q. NO.	ANSWER	MARKS
	The fulfilment depends on recognition depends on assumptions and assumptions depends on knowing or not knowing (beliefs). If assuming is based on knowledge, then recognition will be correct and fulfilment will be correct. If assuming is not based on knowledge, then things may go wrong. The mode of interaction of body is only recognizing and fulfilling. Self is a conscious entity and the body is a material entity, or physic-chemical in nature. Thus we can say: Co-existence Human Being = Self ('I') Body information The conscious entity The material entity that has that desires, thinks, physic-chemical activities imagines like heart-beats, digesting etc. Knowing, assuming, Recognizing and fulfilling Recognizing and fulfilling To conclude we can say that the human being can be understood in terms of a co-existence of two entirely distinct entities, namely sentient 'I' and material body. Their needs and activities are quite different and have to be understood accordingly. But these two constituents of human being are to act in close synergy with each other.	
Ans 3.	Preconditioning means we have assumed something about our desires on the basis of prevailing notion about it. They comes from what we read, see hear, what our parents tell us, our friends talk about what the magazines talk of, what we see on the TV etc. We have not self-verified the desires in our own right. As a result, we are not clear about what we will get out of fulfilment of that desire. The problem with that is, unless we verify our desires, we may not even know whether they are our. We may end up spending an entire lifetime accumulating desires that are not ours, and in running about trying to fulfil them. When our activities are not guided by our natural acceptance, then they are guided by preconditioning and sensations. Preconditioning means we have assumed something about our desires on the basis of prevailing notion about it. We have not verified the desires in our own right. As a result, we are not clear about what we will get out of fulfilment of that desire. What is the issue with that? Unless we verify our desires, we may not even know whether they are our! We may end up spending an entire lifetime accumulating desires that are not our, and in running about trying to fulfil them! Sensation is a perception associated with stimulation of a sense organ or with a specific body condition: the sensation of heat; a visual sensation. We go into conflicts when our activities are not guided by our natural acceptance: Conflicts and contradictions in 'I' as a result of pre-conditioned desire We have not verified the desires, thoughts and expectations in us on the basis of our own natural acceptance. As a result, these desires, thoughts and selections are in conflicts. Since the desires are in conflict, the thoughts they give rise to, are also in conflict and in turn, the selection from the thoughts are also in conflicts. This conflict affects us in different manners:	

Q. NO.	ANSWER	MARKS
	1. **Wavering aspirations:** Our goals keep shifting as the inputs from the outside also keep changing. Our desires thus keep shifting, because their source is outside and these preconditioned desires may come from what we read, see, hear, from media, friends, society, etc. hence, we are always wavering in what we want; we are not able to be certain about it. 2. **Lack of confidence:** Since our desires are shaky, we are not sure about them. As a result, we lack self confidence, in the true sense. Our confidence seems relative i.e. we keep comparing ourselves with others in order to feel confident. 3. **Unhappiness/conflicts:** Since our desires, thoughts and expectations are in conflict, it becomes the cause for our unhappiness, leading to stress and tension. Such desires will also be in conflict with our natural acceptance 4. **Lack of qualitative improvement in us:** We focus largely on fulfilling the needs of the body. As a result, we live with a sense of lack of fulfilment. We are doing many things, accumulating a lot, progressing on paper, but we don't feel that we have improved, that we have become better. It seems that only the things around us are changing! a. **State of resignation:** Because we do not understand ourselves properly and have contradictions within, we slowly start getting disillusioned (pleasant but mistaken beliefs). We feel that there are no solutions to these issues, and end up in a state of resignation. b. **Short lived nature of pleasure from sensations:** The pleasure obtained from sensations is short-lived. We have so much dependent on sensations that instead of giving us some sensory pleasure, it becomes the source for our happiness. This can be understood as follows: The external object is temporary in nature the contact of the external object with the body is temporary in nature. The sensation from the body to 'I' is temporary. And at last the taste of the sensationfrom the body in 'I' is also temporary. Therefore, if the source for our happiness is temporary by definition, then our need for continuous happiness will never be fulfilled. Hence, any sensation we have from the body can't be the source for our lasting happiness. To sum up, if our desires, thoughts and expectations are based on pre-conditionings, we are generally in a state of great confusion. This leads to confusion, unhappiness, conflict and stress. We have lack of clarity about the self, relationships, society, nature and existence. We have lack of confidence. We have a feeling of being unfulfilled, unsettled. We operate largely on the basis of the environment, driven from the outside - either from sensations, or based on pre-conditionings.	

Q. NO.	ANSWER	MARKS
Ans 4.	Character oriented education that instils basic values and ethnic values in one's psyche is called 'Value Based Education'. The subject that enables us to understand 'what is valuable' for human happiness is called value education. Value education is important to help everyone in improving the value system that he/she holds andputs it to use. Once, one has understood his/ her values in life he/she can examine and control the various choices he/ she makes in his/ her life. Value education enables us to understand our needs and visualize our goals correctly and also helps to remove our confusions and contradictions and bring harmony at all levels. It also helps remove our confusions and contradictions and enables us to rightly utilize the technological innovations. Values form the basis for all our thoughts, behaviours and actions. Once we know what is valuable to us, these values becomes the basis, the anchor for our actions. We also need to understand the universality of various human values. Then only we can have a definite and common program for value education and can be assured of a happy and harmonious human society. The subject that enables us to understand 'what is valuable' for human happiness is called value education. In order to qualify for any course on value education, the following guidelines for the content of the course are important: • **Universal:** It needs to be applicable to all the human beings irrespective of cast, creed, nationalities, religion, etc., for all times and regions. • **Rational:** It has to appeal to human reasoning. It has to be amenable to reasoning and not based on dogmas or blind beliefs. • **Natural and verifiable:** It has to be naturally acceptable to the human being who goes through the course and when we live on the basis of such values it leads to our happiness. It needs to be experientially verifiable, and not based on dogmas, beliefs or assumptions. • **All encompassing:** Value education is aimed at transforming our consciousness and living. Hence, it needs to cover all the dimensions (thought, behaviour, work and realization) and levels (individual, family, society, nature and existence) of human life and profession. • **Leading to harmony:** The value education ultimately is aimed at promoting harmony within the individual, among human beings and with nature.The subject that enables us to understand 'what is valuable' for human happiness is called value education. Need for value education is:	

Q. NO.	ANSWER	MARKS
	• Correct identification of our aspirations. The subject which enables us to understand 'what is valuable' for human happiness is called 'value education' (VE). Thus, VE enables us to understand our needs and visualize our goals correctly and also indicate the direction for their fulfillment. It also helps to remove our confusions and contradictions and bring harmony at all levels. • Understanding universal human values to fulfill our aspirations in continuity. Values form the basis for all our thoughts, behaviours and actions. Once we know what is valuable to us, these values becomes the basis, the anchor for our actions. We also need to understand the universality of various human values, because only then we can have a definite and common program for value education. Then only we can be assured of a happy and harmonious human society. • Complimentarity of values and skills. To fulfil our aspirations both values and skills are necessary. When we identify and set the right goals and produced in right direction. This is known as value domain, the domain of wisdom, and when we learn and practices to actualize this goal to develop the techniques to make this happen in real life, in various dimensions of human endeavour (struggle). This is known as domain of skills. Hence, there is an essential Complimentarity between values and skills for the success of any human endeavour. For example, I want to lead a healthy life. Only wishing for good health will not help me keep my body fit and healthy and without having understood the meaning of health, I will not be able to choose things correctly to keep my body fit and healthy. • Evaluation of our beliefs. Each one of us believe in certain things and we base our values on these beliefs, which may or may not be true in reality. These beliefs come to us from what we read, see, hear what our parents tells us, our friends talk about, what the magazines talk of, what we see from TV etc. Value Education helps us to evaluate our beliefs and assumed values. • Technology and human values. The present education system has become largely skill-based. The prime emphasis is on science and technology. However, science and technology can only help to provide the means to achieve what is considered valuable. It is not within the scope of science and technology to provide the competence of deciding what really is valuable. Value Education is a crucial missing link in the present education system. Because of this deficiency, most of our efforts may prove to be counterproductive and serious crises at the individual, societal and environmental level are manifesting.	

Q. NO.	ANSWER	MARKS
Ans 5.	Natural acceptance implies unconditional and total acceptance of the self, people and environment. It also refers to the absence of any exception from others. Once we fully and truly commit ourself on the basis of natural acceptance, we feel a holistic sense of inner harmony, tranquillity and fulfilment. Actually natural acceptance is way to accept the good things naturally. Learn everything that is good from others, but bring it in, and in our own way absorb it; do not become others. We can easily verify proposals in the basis of characteristics of natural acceptance mentioned below: a. Natural acceptance does not change with time. It remains invariant with time. For example our natural acceptance for trust and respect does not change with age. b. It does not depend on the place. Whatever we have accepted, in our life, at any time of our age, does not change, even if we move from one place to another one. c. It does not depend on our beliefs or past conditionings. No matter how deep our belief or past conditioning, as long as we ask ourselves the question sincerely, as long as we refer deep within ourselves, the answer will always be the same. d. This natural acceptance is 'constantly there', something we can refer to. Natural acceptance is always there. Whatever we do, this natural acceptance is within us, it is telling us what is right. e. Natural acceptance is the same for all of us: it is part and parcel of every human being, it is part of humanness. Though each one of us, may have different likes and dislikes and means to live and to react etc. but if we go deep in our mind the purpose of our work, behaviour, efforts etc. are based on common goals like need to be happy, need to be respected, need to get prosperity. So our basic acceptance remains the same.	
Ans 6.	This process of self exploration helps us to identify our swatva and through that acquiring swantantrata and swarajya. Swatva means innateness of self - the natural acceptance of harmony. Swatantrata means being self- organized being in harmony with oneself Swarajya means self-expression, self- extension living in harmony with others SwatvaSwatantrataSwarajya The swatva is already there, intact in each one of us. By being in dialogue with it, we attain swantantrata enabling us to work for swarajya. Living in contradiction, means we are not self-organized and living with pre-conditionings where we have assumed certain things, have accumulated desires without having first evaluated them, then it means we are partantra. On the other hand, when we identify our innateness, what we really want to be and establish a dialogue with it, it enables us to start living with this harmony, it starts expressing itself through our harmonious behaviour and work, and it naturally extends to our participation with the surroundings. This is working towards swarajya.	
	To achieve our basic aspirations we need to work for right understanding as the base on which we can work for relationship and then physical facilities. Today we are not working according to this that why we can see that there are two kind of people in the world:	

Q. NO.	ANSWER	MARKS
	1. Those that do not have physical facilities/ wealth and feel unhappy and deprived. i.e. SVDD: SadhanViheenDukhiDaridra - Materially Deficient, Unhappy and Deprived. 2. Those that have physical facilities/ wealth and feel unhappy and deprived. i.e. SSDD: SadhanSampannDukhiDaridra - Materially Affluent, Unhappy and Deprived. But these are states we don't want to be in. We want to move from this to third category i.e. 3. Having physical facilities and feeling happy and prosperous i.e. SSSS: SadhanSampannSukhiSamriddha - Materially Adequate, Happy and Prosperous. Presently, as we look around, we find most of the people in the above two categories called SVDD and SSDD, while the natural acceptance of all human beings is to be in the category of SSSS.	
Ans 7.	Human beings are a complex combination of the sentiment 'I' which relates to all the feelings and the material 'body' which refers to all the physical facilities available to them. Need of self is sukh (happiness). Sukh is qualitative. Therefore the needs of 'I' are qualitative. They are not quantifiable. We also want them continuously. We cannot talk of one kg of respect or one meter of happiness. Our feelings are qualitative. Either they are or they are not. Happiness is qualitative. Either we are feeling happy or we are not. Also if feeling is not naturally acceptable; we do not want it even for a single moment. If acceptable, we want it continuously. We can see this with the example of respect. We don't want the feeling of disrespect even for a single moment, since it is not naturally acceptable to us. By nature man is fond off comfort and happiness so he goes on making desires and ambitions one after the other to enjoy more in life. To lead a comfortable life he also accumulates many facilities, so that his life may become full of comfort and happiness. Sukh depends upon our thinking, so many times we are surrounded by materialistic possessions but we feel unsatisfied. People think that their happiness depends upon suvidha (facilities) but is it not so; happiness depends upon our thinking or our mental satisfaction. Need of body are physical facilities. Physical facilities are needed for the body in a limited quantity. When we try and exceed these limits, it becomes troublesome for us after some time. Let's take the example of eating. As far as, physical facilities (say rasgulla) go, they are necessary in the beginning, but if we keep consuming, it becomes intolerable with the passage of time. This applies to every physical facility. We can only think of having unlimited physical facilities, but if we try and consume, or have too much of physical facilities, it only ends up becoming a problem for us. When we try to perpetuate physical facilities, the following pattern results.	

Q. NO.	ANSWER	MARKS
Ans 8.	With time it successively changes from: Necessary and tasteful Unnecessary but tasty Unnecessary and tasteless Intolerable! Self exploration is the process to find out what is valuable to me by investigating within myself, what is right for me, true for me, has to be judged within myself. Through self exploration we get the value of ourself. The process of self exploration is a follows: First of all we have to keep in mind that, Whatever is being presented is a PROPOSAL. • Don't assume it to be true immediately, nor reject it without proper exploration. • Verify it in your own right, on the basis of it being naturally acceptable to you, • Not just on the basis of scriptures • Not on the basis of equipment/instrument data • Not on the basis of the assertion by other human beings. Therefore, it is essential to carefully ponder over these on your own right. Neither accept these as true immediately nor reject them prematurely without proper exploration. Don't just accept / reject these only on the basis of the following: Because something like this/ different from this, has been mentioned in scriptures, Or, because it has been preached/ denied by some great men, Or, a large number of people possess such a view / a different view, Or it is claimed to have been verified through some physical instrument or, claimed that this is beyond the domain of verifiability by physical instruments. Then : • Verify on the basis of your natural acceptance • Live accordingly to validate it experientially • If the proposal is true in behaviour with human leads to mutual happiness • If the proposal is true in work when the rest of the nature is in mutual prosperity Remember, it is a process of self- exploration, therefore, it has to be authenticated by us alone by means of verification at the level of natural acceptance and experiential validation. The process is shown in the diagram below: **Process of self exploration -** It is a proposal Don't assume it to be true or Verify it in your own right Not on the basis of scriptures Not on the basis of readings from instrument Not on the basis of others - Self verification Proposal Verify on the basis behaviour with work with rest of the of your natural human leads to nature leads to mutual acceptance mutual happiness prosperity live according to But this process is not complete.	

Q. NO.	ANSWER	MARKS
	It will be completed when on verification on the basis of natural acceptance and testing in our living ultimately results in 'realization' and 'understanding' in us. • Verify on the basis of your natural acceptance • Live accordingly to validate it experientially • The proposal is true in behaviour with human leads to leads mutual happiness • If the proposal is true in work with rest of the nature • Results in realization and understanding • On having realization and understanding we get • Assurance • Satisfaction Take for example: a proposal- 'respect' is a value in human relation. When I verify at the level of natural acceptance, I find that it is naturally acceptable to me. Similarly, when I behave with respect, it is mutually fulfilling to me and to the other. Thus the proposal is 'True'. If it fails on any of the two tests, it is untrue. This verification leads to realization of the truthfulness of the proposal and it becomes part and parcel of my understanding. It is reflected in my thoughts and in my behaviour.	

Note

1. Paper Setter is required to carefully write the answers for the questions, after consulting all the relevant books.
2. For any discripencies found in answers, paper setter will be held responsible for playing with the career of the students,and doing breach of trust with them, and accordingly action can be taken by the disiplinary committee in this regard.
3. Principal before signing for the correctness of the answer shall ensure the same from relevant books. Point No. 1 & 2 above are applicable to Principal also in case any discripencies are found in answers

Dated 12/3/18 . **Signature of Paper Setter** **Signature of Principal/HOD**

Annexure No. SA/14

School of Aeronautics(Neemrana)

I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan

Fortnightly/Term : Mid Term -1 Date : 24. 02. 2018

Subject : **Communication Skill (Th)** Batch : AE-13 & MT - 3

Faculty Name : Ms. Ambika Semester: II

(Answer any FIVE Questions. All Questions carry equal marks) **Total Marks: 45**

Q.No.	Questions	Unit Name / Topic
1.	"Communication is a 2-way process." How? (9)	Unit No.: Topic Name: Source:
2.	Explain downward channel of communication. (9)	Unit No.: Topic Name: Source:
3.	Explain upward channel of communication. (9)	Unit No.: Topic Name: Source:
4.	Fill in the correct conjunctions a) He is not ..... clever as his brother. b) He must be punished ..... he is guilty. c) A fool ..... his money are soon parted. d) He was not punished ..... he was guilty. e) He worked hard ..... he might pass the examination. f) Give every man thy ear, ... few thy voice. (9)	Unit No. Topic Name: Source:

Q.No.	Questions	Unit Name / Topic
5.	What do u mean by written communication? What are it's advantages and disadvantages? (9)	Unit No.: Topic Name: Source:
6.	Explain sender oriented barriers with remedies. (9)	Unit No.: Topic Name: Source:
7.	Explain receiver oriented barriers with remedies. (9)	Unit No.: Topic Name: Source:
8.	What do you mean by oral communication. What are it's advantages and disadvantages? (9)	Unit No. Topic Name: Source:

Annexure No. SA/35

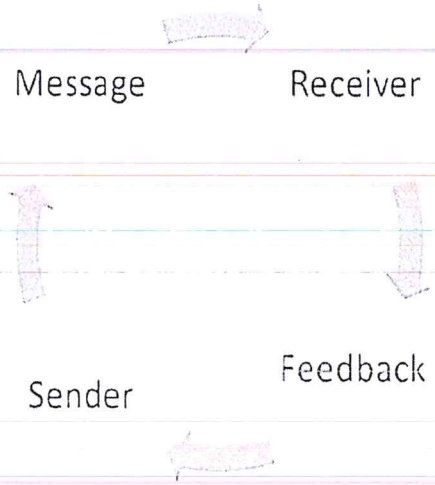
School of Aeronautics (Neemrana)

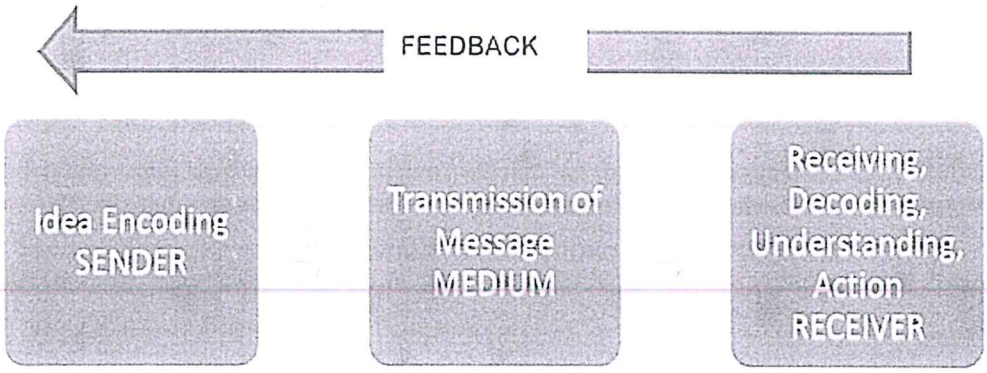
I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan

MODEL ANSWER PAPER

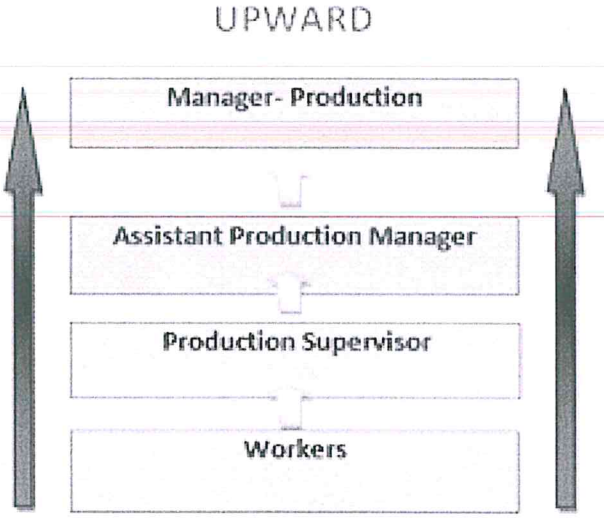
Name of Examination: Mid Term - 1 Date of Examination: 27.02.2018

Subject Communication Skill Batch 13 & MT- 3 Semester II

Q. NO.	ANSWER	MARKS
Ans. 1.	Communication involves a sender and receiver. When the message is transmitted from the sender to receiver then the receiver gives a feedback for that message which completes the cycle of communication.  The steps involved in communication are: Encoding of message Transmission of message Reception Decoding Feedback Since, Communication means to communicate or to exchange one thoughts and information. Till the receiver doesn't sends the feedback the process of communication is not completed and the goal of communication is not fulfilled. The sender and receiver both play a crucial role in the process of communication. The sender has an idea which is put into words. Then that message is transmitted to receiver by any means. This medium is a communication is a communication channel. This makes sender eligible to send feedback of the message. When receiver sends his/her response back to the sender. This enables to sender to determine whether the message has been received and produced the intended response.	

Q. NO.	ANSWER	MARKS
		
Ans 2.	Downward communication occurs when information and messages flow down through an organization's formal chain of command or hierarchical structure. In other words, messages and orders start at the upper levels of the organizational hierarchy and move down toward the bottom levels. Responses to downward communications move up along the same path. **Advantages :** 1. Delegating authority and responsibility: Delegation means entrusting the subordinates with some responsibilities along with due authority. It is essential to make the subordinates capable in performing their jobs. Since downward communication starts form higher level, it helps mangers in delegating authority and responsibility to the right persons. 2. Marinating discipline: Downward communication occurs in conformity with officially recognized rules and regulations. So it helps in establishing official discipline in the organization. 3. Increasing efficiency: Downward communication provides necessary guidance, orders, instructions and explanations of various complex issues to the subordinates that ultimately increase the efficiency of the employees. 4. Informing organizational plans and procedures: In an organization, the top-level executives develop the plans, policies, strategies, procedures etc. downward communication plays a significant role in communicating those plans, policies, strategies' and procedures to the lower levels of the organization. 5. Explaining the complex issues: Sometimes subordinates need explanation of organizational policies and procedures. In such situations, managers rely on downward communication to provide necessary explanations and analysis.	

Q. NO.	ANSWER	MARKS
	6. Issuing orders and instructions: Downward communication is the only means to circulate various orders, instructions, guidance and advices to the subordinates. Without downward communication, organization is like a boat without boatman. 7. Avoiding by-passing of hierarchy: Downward communication takes place by following the established chain of command of the organization. Thus, it reduces the chance of sending message to someone through by-passing the immediate subordinate. 8. Maintaining good labor-management relationship: Downward communication helps to create and maintain good labor-management relationship in the organization. When top-level executives communicate with their subordinates sincerely and courteously, it develops good interpersonal and inter-group relationships between management and works. In turn, this will motivate the employees and ensure good labor management relation in the organization. **Disadvantages:** 1. Time consuming: Downward communication is a delayed process. In this communication, information flows through different levels of hierarchy. As a result, when information reaches to the lower level workers, it may have lost its significance or utility. 2. Distortion of information: Downward communication also suffers form problem of distortion of message. People have the tendency to modify or manipulate information. Therefore, information is passed from one individual to another or form one level to another, authenticity of information is lost. 3. Lack of explanation: In most cases, downward communication contains messages without necessary explanation and clarification. For this reason, subordinates fail to understand the message accurately. 4. Deterioration of relationship: Heavy reliance on downward communication also deteriorates labor-management relationship. Because, it does not provide any scope of direct communication between them. 5. Lack of feedback: Absence of feedback is another major drawback of downward communication. The top-level executives usually place little or no importance to the messages received from subordinates. Superiors hardly seek feedback from the subordinates. Due to negligence of the superiors, subordinates also seldom send feedback. As a result, communication becomes ineffective.	

Q. NO.	ANSWER	MARKS
	6. Lack of enthusiasm: Managers send orders instructions and advices to the subordinates through downward communication. This form of communication energizes and activates the employees. Therefore, delay in the downward flow of information adversely affects the enthusiasm of the employees. 7. Creation of frustration: Downward communication is directive in nature. This type of communication hardly allows the subordinates to discuss any matter with their superiors. Moreover, the subordinates are compelled to follow the orders and instructions of the superiors. Such coercion creates frustration in the mind of the employees.	
Ans 3.	Communication is a very important part of working in the business environment. Managers must be able to communicate with employees and employees must be able to communicate with managers in order to have a profitable business. Upward communication is the flow of informationfrom front line employees to managers, supervisors, and directors. 	

Q. NO.	ANSWER	MARKS
	Advantages : 1. Development of plan: The information received from subordinate plays important role to help development of planning of the organization. 2. Providing suggestions and opinions: By upward communication system, subordinate takes necessary suggestions and opinions from superiors about the work related issues of the organization. 3. Motivating to employees: Upward communication system allows lower level staff to express their attitude or opinion to upper level staff. As a result sub-ordinates are influenced to work more towards fulfillment to target. 4. Providing constructive suggestion: All employees are supplied with constructive and important messages that can help to implement the goals or objectives. 5. Good labor-management relationship: Upward communication I participative in nature. Here, information is invited from lower level executives and employees and on the basis of this information top executive makes a decision. So, a good relation between subordinates and bosses should create for the betterment of the organization. 6. Providing feedback: The subordinate's reaction is returned to the superior in this communication system. So, top level management can decide what to do and what not do clearly understand and followed. 7. Creating favorable environment: Upward communication helps to develop a favorable working situation in an organization by creating a good relation among all employees. 8. Promote harmony: Upward communication creates friendly environment in the organization which lead to peaceful and harmonious relationship among the subordinates and superiors. 9. Decision making: Top level executives or superiors needed much information before taking a decision on a particular issue. Subordinates supply this information through the help of upward communication. 10. Developing creative and innovative ideas: Upward communication facilitates easy excess of the employees or subordinate to the superiors in providing necessary constructive suggestions and opinions about the work related issues of the organization. 11. Facilitating collective decision: Since upward communication is participative in nature. It communication allows the subordinates to convey their feelings, constructive suggestions and opinions and the work related in the decision making process.	

Q. NO.	ANSWER	MARKS
	Disadvantages: 1. Changes of information: In upward communication subordinates may change their accurate information. So, top executive cannot take accurate decision. 2. Unwillingness: Sometimes subordinates don't send the information to their superior willingly. So, communication system may be disrupted. 3. Fear of inefficiency: The main problem of the upward communication is fair to superiors. Generally superiors make a question about the employees work position and efficiency. Many employees fear to communicate and share their ideas, constructive suggestions and opinions with the superiors. 4. Indiscipline: Sometimes employees communicate directly to superior by avoiding proper channel or chain of command. Here disciplines are not properly maintained. 5. Bypassing: In the process of upward communication, sometimes workers directly approach the top most authority with their suggestions or by passing their immediate boss. This is harmful to any organization. 6. Flattery: In order to convince the superior bosses, subordinates can take the help of flattery and for this reason subordinates may conceal the true and provide incomplete information to top level. 7. Lake of initiative: Generally subordinate is reluctant to take the initiative to upward communication for different reason. 8. Risk of distortion of messages: In upward communication, subordinates willingly distort the message because they fear if they tell the original fact to their bosses, they may face some problems. 9. Delay: It is an important limitation of upward communication is the long and slow movement of information to the higher authority. 10. Supervisor's negligence: Sometimes top level executives discourage the upward flow of information and neglect the constructive suggestions and opinions about the work related issues of the organization.	
Ans 4.	1. He is not so clever as his brother. 2. He must be punished because he is guilty. 3. A fool and his money are soon parted. 4. He was not punished though he was guilty. 5. He worked hard that he might pass the examination. 6. Give everyman thy ear, but few thy voice.	

Q. NO.	ANSWER	MARKS
Ans 5.	A 'Written Communication' means the sending of messages, orders or instructions in writing through letters, circulars, manuals, reports, telegrams, office memos, bulletins, etc.It is a formal method of communication and is less flexible. A written document preserved properly becomes a permanent record for future reference.It can also be used as legal evidence. It is time-consuming, costly and unsuitable for confidential and emergent communication.Written communication, to be effective, should be clear, complete, concise, correct, and courteous. **Advantages of Written Communication:** 1. It is suitable for long distance communication and repetitive standing orders. 2. It creates permanent record of evidence. It can be used for future reference. 3. It gives the receiver sufficient time to think, act and react. 4. It can be used as legal document. 5. It can be sent to many persons at a time. 6. It is suitable for sending statistical data, chart, diagram, pictures, etc. 7. Order, allocation of work, job distribution, etc. in written form reduce ambiguity and help in fixation of responsibility. 8. Uniformity in work procedure can be maintained through written communication. 9. It is easy to send unpleasant or bad news through written communication. 10. A good written communication can create goodwill and promote business. **Limitations or Disadvantages of Written Communication:** 1. It is time-consuming. Composing a message in writing takes much time. Writing letters, typing orders, notices, etc. and sending to appropriate destination require time. Feedback process also is not instant. 2. It is expensive not so much due to postal charges but in terms of so many people spending so much of their time. 3. It cannot maintain strict secrecy which would have been possible in oral communi-cation. 4. Written communication has no scope for immediate clarification if not understood properly. 5. Being written in nature it is less flexible and cannot be changed easily. 6. It is not effective in the case of emergency.	

Q. NO.	ANSWER	MARKS
Ans 6.	Sender-oriented barriers could be voluntary or involuntary. At any cost, efforts should be made on the part of the sender to identify and remove them. As the sender is the originator of communication, he should be extremely careful not to erect barriers. If his interaction gives rise to or indicates that there are barriers, the communication comes to a grinding halt. **Some of the barriers that are sender-oriented are as follows:** **1. Badly Expressed Message** Not being well versed in the topic under discussion can create problems of this nature. The sender may not be able to structure his ideas accurately and efficiently. What he wishes to say and what he finally imparts may not be the same. The discrepancy emerges as soon as the words are uttered. In fact, one of the important criteria at the time of initializing a piece of communication is that ideas should be concrete and the message should be well structured. The receiver should not feel that the interaction is a waste of time. The moment this feeling crops up, the listener totally switches off and thus ceases the process of effective communication. **2. Loss in Transmission** This is a very minor issue but one that gains in magnitude when it leads to inability in transmitting the actual message. Once again, if the choice of the channel or medium is not right, the impact of the message is lost. This is mostly a physical noise. However, the responsibility lies with the sender, as he should ensure that all channels are free of noise before commencing communication. **3. Semantic Problem** High and big sounding words definitely look and sound impressive. But if the receiver is not able to comprehend the impact of these words, or if they sound 'Greek' or 'Latin' to him, the entire exercise proves futile.This problem could arise in the interpretation of the words or overall meaning of the message it is also related to the understanding of the intention behind a particular statement. For the receiver, e.g., the sanctity associated with the word "white" might be violated when the receiver uses it in a careless fashion. The idiosyncrasies of the receiver should be well understood by the sender if he does not wish these barriers to crop up at the time of communication. The look on the face of the listener should be sufficient to warn the sender that he has overstepped his limits or he has been misunderstood. **4. Over/Under Communication** The quantum of communication should be just right. Neither should there be excess information nor should it be too scanty.Excess information may confuse the receiver as he has to figure out the exact import of the message, and scanty information would make him grope for the actual intent of the message.	

Q. NO.	ANSWER	MARKS
	The sender should, as far as possible try to get the profile of the receiver so that at the time of communication he knows how much material is needed and how much can be done away with. Suppose he starts with some information that the receiver already possesses, the latter might lose interests it is merely repetition of what he already knows. So by the time he arrives at the core of the matter, he had already lost the attention of the receiver. **5. 'I' -Attitude** Imagine a piece of communication that begins and ends with the pronoun "I". How tedious it is going to be for the listener to sit through the entire piece of interaction. If the sender starts every sentence with "I", it gradually leads to what is referred to as the I-syndrome.He would not be receptive to changes, if suggested by the receiver; as such, changes would go against his personal formulation of certain views. **6. Prejudices** Starting any piece of communication with a bias or know-it- all attitude can prove to be quite detrimental to the growth of communication process. Though it is easier said than done, still, when communication commences, all sorts of prejudices should be done away with, and the mind should be free of bias.This would enable the sender to formulate his message, Mind, free of keeping only the receiver and his needs in mind. Thoughts like "Last time he said this.. " Or "Last time he did this…" or "He belongs to this group…" can totally warp the formulation of the message. This barrier can also be extended to the receiver. If the respondent starts with prejudices in mind, he too would be unable to listen to the intent of the message. His understanding of the message is going to be warped. The messages are going to be understood in relation to the prejudices that a receiver harbors against the sender.	
Ans 7.	Receiver Oriented Communication Barriers. Receiver can also have some barriers in the course of the interaction. Although his role in the initial phase is passive, he becomes active when he starts assimilating and absorbing the information. He is equally to blame if the situation goes awry and communication comes to a stop, or there is miscommunication. **Some of the barriers emanating from the side of the receiver are as follows:** **1. Poor Retention** Retention is extremely important during interaction. If the receiver has poor retention capability, he would probably get lost in the course of the proceedings. There would be no connection between what was said initially and what is being said now. He might counter statements instead of seeking clarifications that might lead to clamping on the part of the sender.	

Q. NO.	ANSWER	MARKS
	If the decoder feels that his retention capacities are not good, a judicious strategy for him would be to jot down points. It does not portray him in a poor light. On the contrary, it shows how conscientious he is to get the message right. **2. Inattentive Listening** The mind has its own way of functioning. It is very difficult to exercise control over one's mind. Listening is more of an exercise in controlling the mind and exercising it to assimilate messages. The errors in listening arise primarily because the receiver is either not interested in what is being said, or has other things to concentrate on. The art of listening is an exercise in concentration. **3. Tendency to Evaluate** Being judgmental and evaluative are both the starting points for miscommunication. Remember, one mind cannot perform two activities at the same time. If it is evaluating, listening cannot take place. Evaluation should always be a sequel to the listening process. It cannot be done simultaneously with listening. The minute sender opens his mouth, if the listener starts mentally pronouncing judgments concerning his style or content, he has actually missed out on a major part of what has been said. His responses naturally are then going to be incorrect or expose his misunderstanding. **4. Interests and Attitudes** "I am not interested in what you are saying" or "My interest lies in other areas". Starting any piece of communication with this kind of indifference can thwart any attempts at communication. Fixed notions of this kind should be dispensed with. It is not possible to be interested in all that is being said. But to start any communication with this notion is hazardous. **5. Conflicting Information** Dichotomy in the information that the receiver possesses and that which is being transmitted can create confusion and result in miscommunication. Conflict between the existing information and fresh one results in elimination of the latter unless and until the receiver is cautious and verifies with the sender the reliability and validity of the message. The sender should convince the receiver that whatever is now being said is correct and relevant to further proceedings. **6. Differing Status and Position** Position in the organizational hierarchy is no criterion to determine the strength of ideas and issues. Rejecting the proposal of a subordinate or harboring a misconception that a junior cannot come up with a "eureka" concept is not right.	

Q. NO.	ANSWER	MARKS
	In fact, many companies have started encouraging youngsters to come up with ideas/ solutions to a particular problem. These ideas are then discussed among the senior managers and their validity is ascertained keeping the workings and the constraints of the company in mind. The basic purpose of this upward traversing of ideas is that fresh and innovative minds can come up with unique solutions. If an individual has been working in a particular company for some years, it is natural that his mind gets conditioned in a particular manner. Challenging newcomers to innovate, as a part of company policy takes care of ego problems that may arise if this is not an accepted norm. **7. Resistance to Change** Fixed ideas, coupled with an unwillingness to change or discuss, hampers listening and results in miscommunication. Novae concepts that require discussion before they can really materialize, if rebuked, fall flat. The onus lies directly on the receiver who is unperceptive and unwilling to change. People with dogmatic opinions and views prove to be very poor communicators and erect maximum number of barriers. **8. Refutations and Arguments** Refutations and arguments are negative in nature. Trying to communicate with the sender on the premise that refutations and arguments can yield fruitful results would prove to be futile. Communication is a process in which the sender and the healthy receiver are at the same level. The minute refutations or discussions arguments begin; There is a shift in balance between the two participants, after which the receiver moves to a conceived higher position and the sender remains at the same level. In case there are some contradictions that need to be resolved, discussion is the right way to approach. Listening to the views of the other, trying to understand or at least showing that there has been understanding, appreciating and, finally, positing own views should be the sequence to be followed. The strategy adopted should not make the sender feel small or slighted.	
Ans 8.	Oral communication is the process of expressing information or ideas by word of mouth. Learn more about the types and benefits of oral communication, and find out how you can improve your own oral communication abilities. **The advantages of oral communication are as follows:** **1. Time saving**: When action is required to be taken immediately it is best to transmit a message orally. If the executives work load is high then they stop writhing and by oral instructions they complete their message transmission and released their work load and also it saves time.	

Q. NO.	ANSWER	MARKS
	2. **Cost savings**: Cost is involved in any communication. When the communication is needed within the organization and if it and is completed in orally, it has not needed any paper, pen or stamp or computer. So it saves the money of the organization. 3. **More powerful**: Speech is a more powerful means of persuasion and control. Therefore, executives often prefer to transmit messages orally. 4. **Effectiveness**: With the help of variations in the tone, pitch and intensity of voice, the speaker can convey shades of meaning. This factor also contributes to the effectiveness of oral communication. 5. **Immediate feedback**: The speaker can get immediate feedback on whether it is creating a favorable impression on the receiver or whether the receiver will protest or whether the receiver has receiver has clearly understood his meaning or is feeling perplexed or baffled and he can mold and adjust his message accordingly. 6. **More suitable**: The employees felt more suitable when the message transmits in orally. They get an opportunity for feedback and clarification. 7. **A relationship develops**: Oral communication is mostly carried out helps to promote friendly relations between the parties communicating with each other. 8. **Flexibility**: By the demand of the situations, oral instructions can be changed easily and for these cases maintain the formalities are not necessary. So it is very much flexible and effective. 9. **Easiness**: It is so easy method of communication. It needs little preparation to send a message. No need of pens, pencils and other writing equipment's which are needed in written communication. 10. **Correction of errors**: If any error is expressed at the time of oral communication. It was possible to rectify at that time or within a very short time. 11. **Informal communication**: In **oral communication**, no need to maintain such formalities which are needed in written communication. So it is easy and helpful to any organization. 12. **Motivation**: In oral communication system, top executives and sub ordinates staff can sit face-to-face and exchange their views directly, so sub-ordinates are motivated day by day. 13. **Special applications**: Oral communication is more helpful in communicating messages to groups of people at assembly meetings etc. 14. **Maintaining secrecy**: Interested parties of oral communication can maintain the secrecy of messages easily. **DISADVANTAGES OF ORAL COMMUNICATION** Oral communication contains many advantages. In spite of this, there are oral some disadvantages which are given below:	

Q. NO.	ANSWER	MARKS
	1. No record: In oral communication, messages are difficult to record. So it is impossible to preserve the message for future. 2. Expensive: It is also expensive media of communication. Sometimes the audience can be managed by paying T. A and D. A. On the other hand Technological devices that are used in this system are costly. 3. Distortion of the word: If distortion of the word occurs in oral communication, then main goals of the organization may be filed. 4. Inaccuracy: There is very possibility of inaccurate messages to reach the destination. So, the reverse result of expected plan may be occurred. 5. Limited use: The scope of usage of oral communication is limited. It is not suitable for lengthy messages. It should be sued for short message. 6. Probability of omitting main subject: Sometimes, main subject may be omitted to express a word for communicating. So, expected result may not be achieved. 7. Confused speech: Sometimes the receiver fails to understand the meaning of a message due to habitual productions of the speaker. 8. No legal validity: there is any legal validity of the oral message. As, the oral messages are not taped and kept records, so it can be denied easily if the situation goes against the speaker. 9. Late decision: It takes time to reach a decision. At the beginning stage, sometime is killed in the discussion of any personal matters. Besides some time is also wasted for irrelevant discussion. In this way decision making is delayed. 10. Less important: In oral communication, meaningless speech can mislead the main effects of the communication. But when the information comes out in written, we take it seriously. 11. Lack of secrecy: In oral communication, the important and secret information may be disclosed. 12. Defective: Oral communication is defective for company's policy, procedure, programs, law and other important information. 13. Creates misunderstanding: The speaker often gives message without having properly organized it earlier. So, it is possible that he may not be able to make himself properly to communicate with the receiver. As a result, misunderstanding may develop. 14. Idea.	

Note

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2. For any discripencies found in answers, paper setter will be held responsible for playing with the career of the students,and doing breach of trust with them, and accordingly action can be taken by the disiplinary committee in this regard.
3. Principal before signing for the correctness of the answer shall ensure the same from relevant books. Point No. 1 & 2 above are applicable to Principal also in case any discripencies are found in answers

Dated 12/3/2018 . **Signature of Paper Setter** **Signature of Principal/HOD**

School of Aeronautics(Neemrana)

I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan

Fortnightly/Term : Mid Term -1 Date : 26. 02. 2018

Subject : Engg. Chemistry (Th) Batch : AE-13 & MT-3

Faculty Name : Dr. Anu Sharma Semester: II

(Answer any FIVE Questions. All Questions carry equal marks) **Total Marks: 45**

Q.No.	Questions	Unit Name / Topic
1.	(a) Name properties of lubricants. (b) Give full form and monomers of SBR & NBR. (c) Give formula and definition of viscosity index. (d) Give structure of Elastomer, Graphite. (e) Define Steam Emulsification Number. (2x4+1)	Unit No.: Topic Name: Source:
2.	Write note on followingPrep,Prop,&uses(Any Two): (a) Tyrelene (b) Bakelite (c) Kevlar (d) Neoprene (9)	Unit No.: Topic Name: Source:
3.	Explain Classification of lubricants with special emphasis on Solid and semi solid Lubricants. (9)	Unit No.: Topic Name: Source:
4.	Give account on any two of the following: With measurement assembly. (a) Cloud & Pour point (b) Flash & Fire Point (c) Viscosity (9)	Unit No. Topic Name: Source:

Q.No.	Questions	Unit Name / Topic
5.	Write note on any three: (a) SBR (b) NBR (c) Isoprene (d) Elastomers (9)	Unit No.: Topic Name: Source:
6.	Give detailed account on types of lubrication. (9)	Unit No.: Topic Name: Source:
7.	Define vulcanization. Give structure of vulcanized rubber and advantages of Vulcanization. (9)	Unit No.: Topic Name: Source:
8.	Define polymers; Give classification of polymers in detail. (9)	Unit No. Topic Name: Source:

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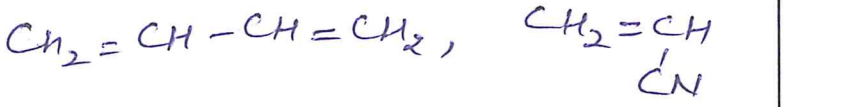
I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan

Total Pages - 17 + one back side

MODEL ANSWER PAPER

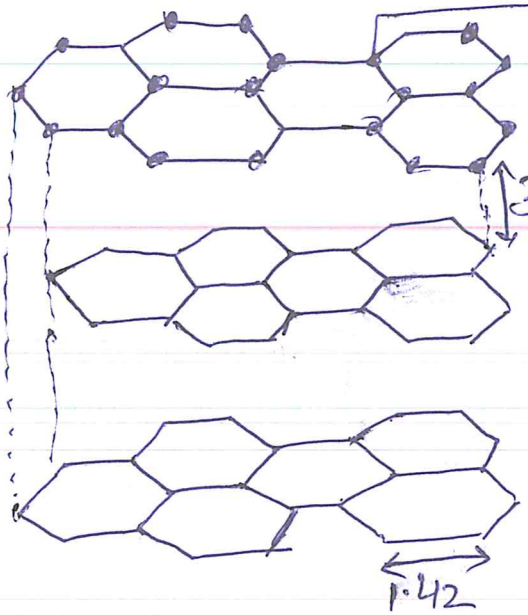
Name of Examination: Mid-Term Date of Examination: .

Subject Engg. Chemistry. Batch 13, MT-3 Semester II

Q. NO.	ANSWER	MARKS
1(a)	**Properties of Lubricants.** Viscosity Viscosity Index Cloud point Pour point Fire point Flash point Steam emulsification Number.	2
(b)	SBR - Styrene butadiene Rubber. Monomers - 1,3-butadiene & Styrene.  $CH_2=CH-CH=CH_2$,	2
	NBR - Nitrile Rubber Monomers :- 1,3-butadiene, acrylonitrile 	
(c)	**Viscosity Index :-** Rate of change of viscosity with temperature is termed as V.I. Low-Viscosity Index oil → Lubricant whose Viscosity changes abruptly with temperature change. High Viscosity Index — Lubricants whose Viscosity changes gradually with temperature change.	2
	$V.I. = \frac{L-U}{L-H} \times 100$	

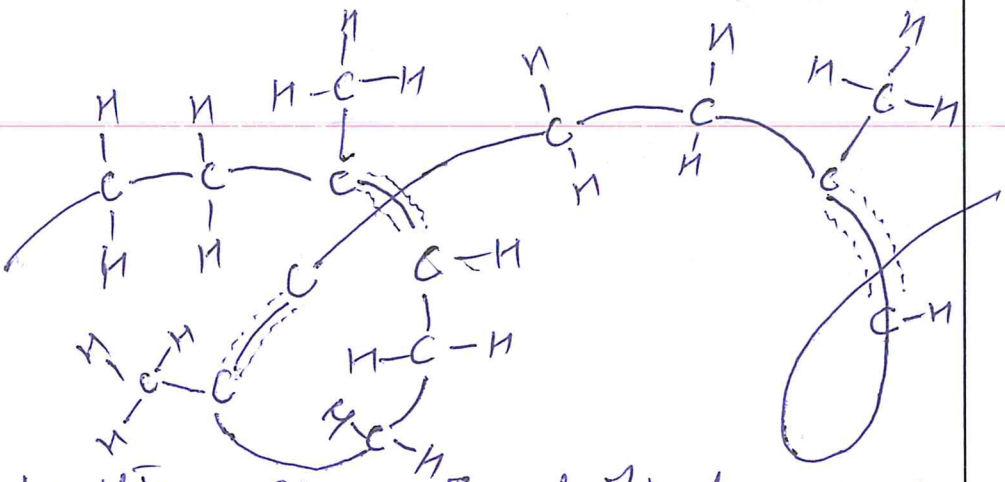
Q. NO.	ANSWER	MARKS

(d) Graphite – Hexagonal layered structure with sp^2 Hybradisation, each carbon joined by three bonds & sp^2 hybradised.



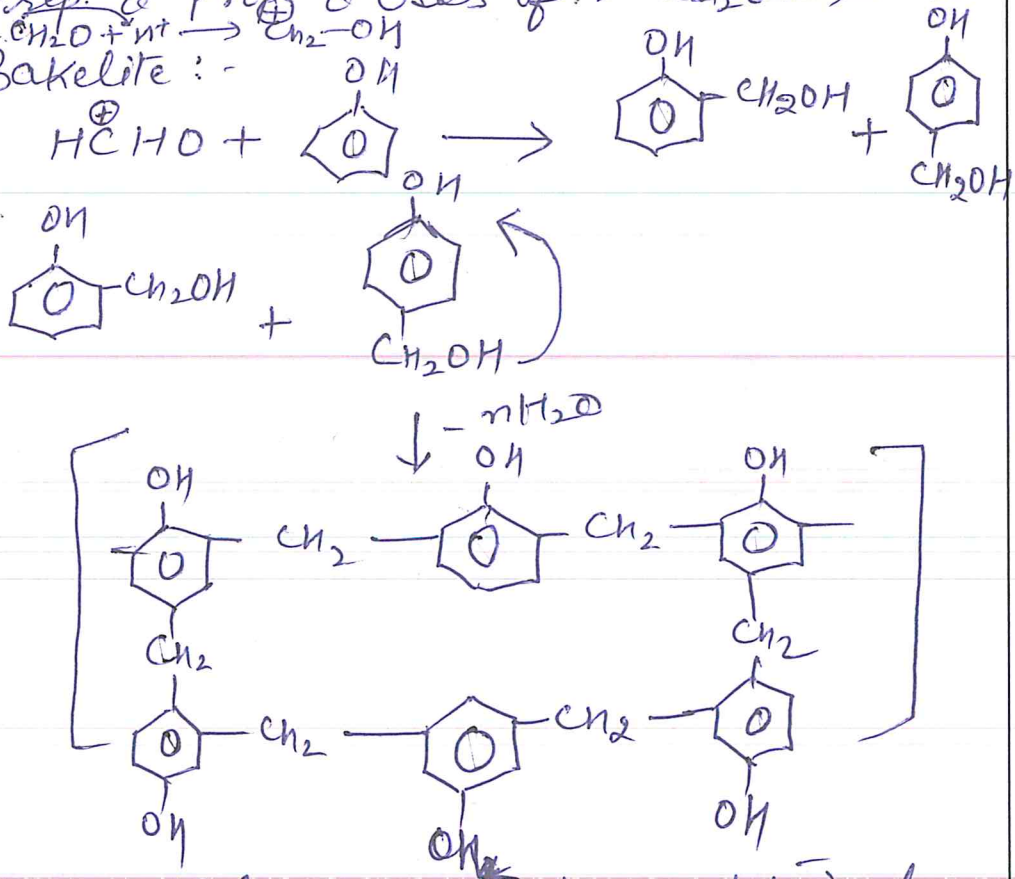
2

(e)

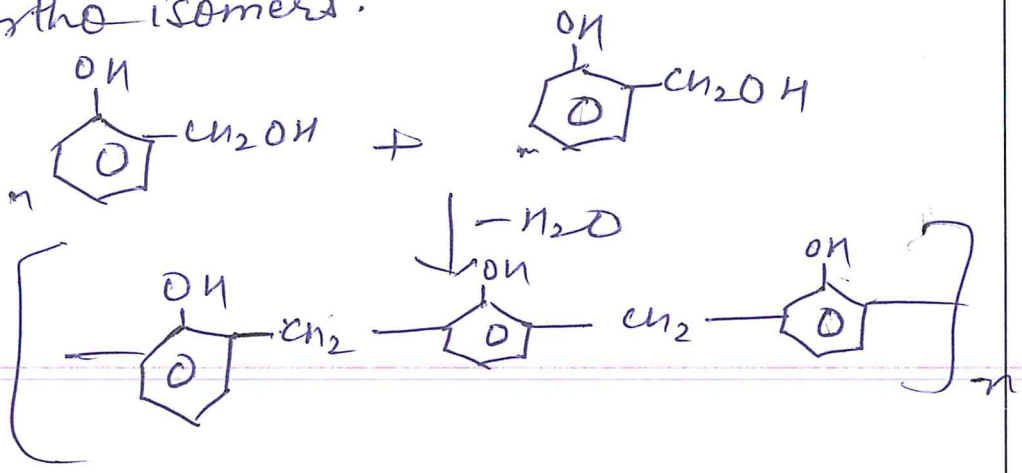


(e) Definition:- Steam Emulsification Number is defined as the time in seconds taken by oil and water layer to get separate. 1

Q. NO.	ANSWER	MARKS
2. (a)	Prep. & Prop & Uses of :- Bakelite :-	10



Alternatively it can be obtained directly by heating Novolac that can be obtained by joining two ortho isomers.



Q. NO.	ANSWER	MARKS

Properties of Bakelite

1. Bakelite Plastic is rigid, hard, scratch resistance.
2. Exhibits good chemical & abrasion resistance.
3. Colour of bakelite is dark pinkish or Brown.
4. Excellent electrical Insulator.
5. This plastic is affected by concentrated caustic alkalies due to number of free OH-groups in its picture.

Uses of Bakelite:-

1. For making domestic plugs and switches.
2. For making Handles for cookers & saucepans.
3. Used in Paper fabrics & wood Industries.
4. For making automotive, Radio, TV, Telephone parts. 4.5
5. Used for adhesives, bearing, points and Varnishes etc.
6. Utilised to form switches, boards, cabinets etc.

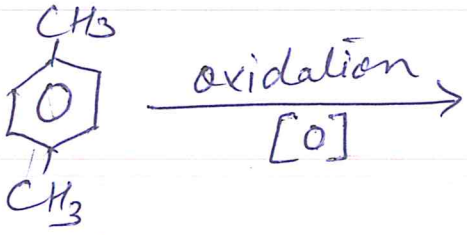
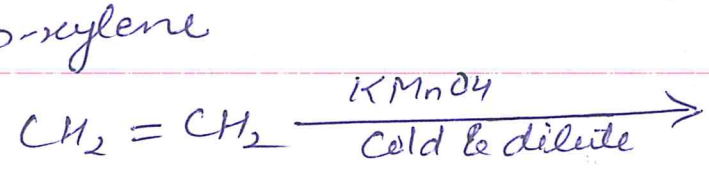
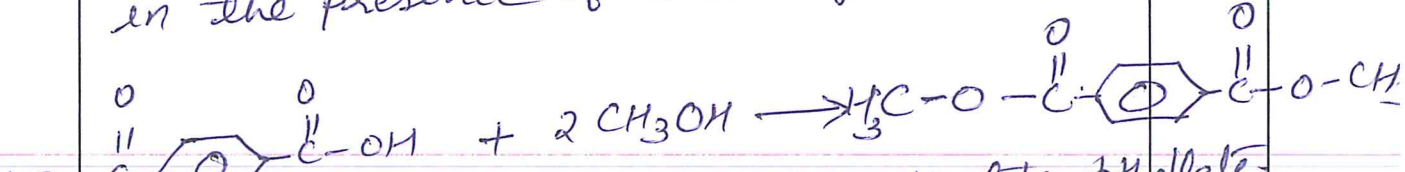
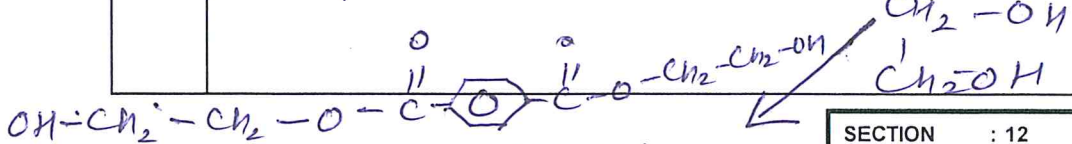
School of Aeronautics (Neemrana)

I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan

MODEL ANSWER PAPER

Name of Examination: _____ Date of Examination: _____

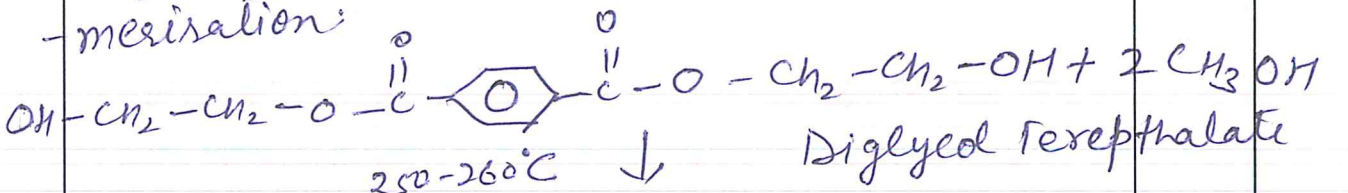
Subject Engg. Chem. Batch _____ Semester _____

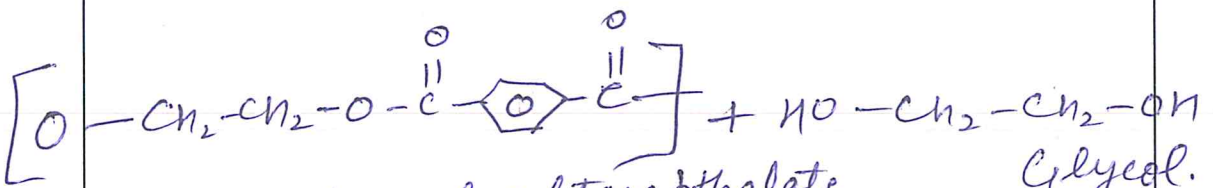
Q. NO.	ANSWER	MARKS
(b)	Terylene :- (Polyester) Step-I. Most Important polymer of polyester class It Involves polymerisation of terepthalic acid and ethylene glycol. Terepthallic acid is prepared from p-xylene whereas glycol is obtained from ethylene.  p-xylene Terepthallic acid.  Step-II Terepthallic acid is converted into dimethyl ester by treating with methyl alcohol. Dimethyl ester is treated with excess of glycol in an temp. Range of 195-200°C in the presence of a catalyst  + 	

Q. NO.	ANSWER	MARKS

Step-III

Diglycol terepthallate is now heated at 200°C at atmospheric pressure, followed by more heating at 250-260°C under reduced pressures to remove the excess of glycol and to complete the polymerisation.





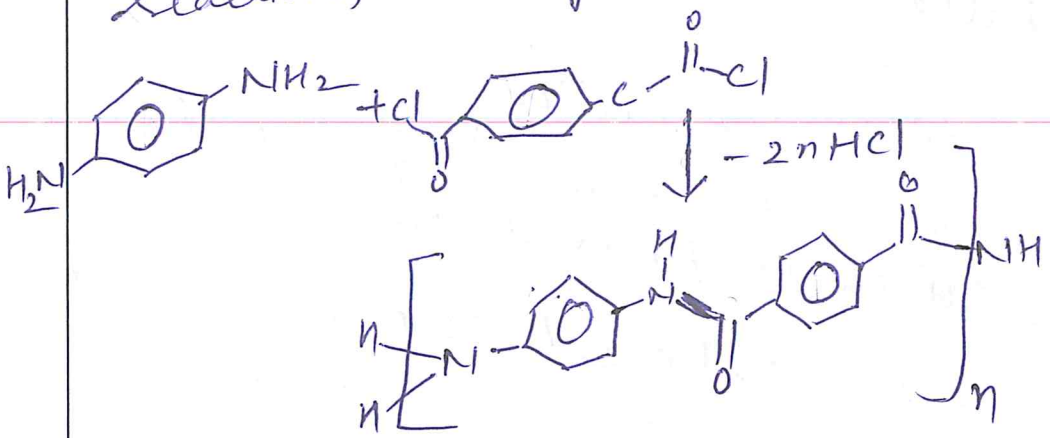
Properties:-

(i) It is a good fibre forming material.
(ii) Low moisture absorption, Hence they are more durable.
(iii) Highly Resistant to mineral and organic acids but is less resistant to alkalies.

Uses:-

(i) They are used in making magnetic tapes.
(ii) Terylene fibers are used in manufacturing of textiles.
(iii) It can be blended with wool, cotton for better use and wrinkle Resistant
(iv) Also used as glass reinforcing material in safety helmets, car & old batteries boxes. etc

4.5

Q. NO.	ANSWER	MARKS
(c)	Kevlar :- Its possessing very high degree of toughness and low density, Bullet proof plastic materials. Kevalar is polyamide (aromatic). Here aliphatic chains with benzene rings linked to amide groups -CONH- . Its formed as a result of diamine with a dichloride. Its a synthetic fiber 8 times more strong than steel Kevlar, monomers are 1,4-phenylene-diamine & terephthaloyl chloride in a condensation reaction, leading to HCl as byproduct  Kevlar.	

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Dated _____ . **Signature of Paper Setter** **Signature of Principal/HOD**

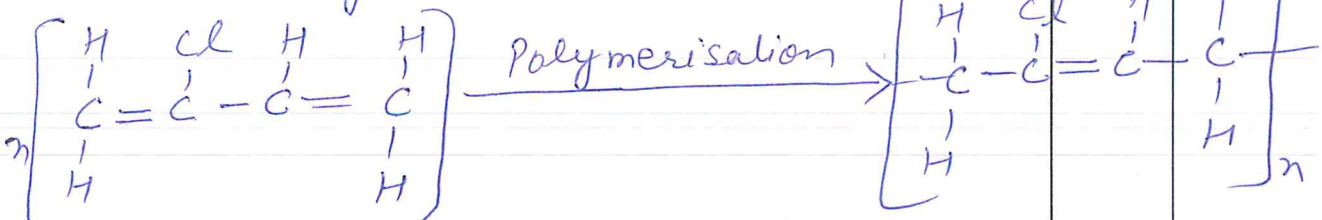
School of Aeronautics (Neemrana)

I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan

MODEL ANSWER PAPER

Name of Examination: _____ Date of Examination: _____

Subject Engg. Chemistry Batch 13, MT-3 Semester II

Q. NO.	ANSWER	MARKS
2(d)	**Neoprene** - GR-M (Polychloroprene, Duprene). (monomers - 2-Chloro-1,3-butadiene) Neoprine is prepared by free radical polymerisation of chloropsene, in an emulsion system.  2-chloro-1,3-butadiene Chloropsene. Properties - Physical properties are enhanced by Compounding it with ZnO & MgO (metallic oxides) - exhibits good resistance to ozone and abrasion, Thereby preventive oxidative degradation Uses - in making - - tubing for corrosive gases & oils - Gloves - conveyer belts. - Industrial Gaskets. - Sponges, Shoe soles. - Insulating coatings.	(3)
Q3.	On the Basis of Physical state Lubricants can be classified into following categories- (i) Solid (ii) Semisolid (iii) Liquid (iv) Emulsions. **Solid Lubricants** Those solid materials which are used to separate two moving surfaces, under boundaries condition in order to reduce wear and tear in system. **Conditions to use Solid Lubricants:-** (i) when Load is very high & Speed is Low. (ii) operating temp is such a high that Semisolid Lub. does not Stay at desired place. (iii) Lubricant catch fire or get chars. (iv) Contamination of Lub. oil or Grease is undesirable.	

Q. NO.	ANSWER	MARKS

Most commonly used Lub. are Graphite & MoS_2

Structure of Graphite & MoS_2 → Characteristic features of Graphite & MoS_2.] Give them

① Graphite with water (dispersion) is called aqua-dag (less) & is applicable in machines of beverages Industry

② Graphite in oil - is called oil dag, oil dag is used in Internal combustion engines because it forms a film between cylinder and piston Rings to give a tight fit contact, which increases the compression of air fuel mixture.

SEMI SOLID LUBRICANTS :-

Semisolid Lubricants or greases are thixotropic gel consisting of metallic soaps dispersed in a liquid lubricating oil. (9)

- Give points where they are used.
- Types of Greases depending upon base of Soap.

eg (i) Sodium soap grease (ii) Lime or Ca-soap grease, Lithium soap grease (iii) Rosin Soap grease (iv) Aluminium soap grease (v) Slaked lime + emulsified oil + water) grease or axle grease (

Give uses of solid / semisolid Lubricants.

Q.4. (a) Cloud & Pour point :- (4.5)

These points Indicates suitability of Lubricants in the machines working under low temperature conditions.

"when a Lubricating oil is cooled in a standard apparatus at a specified Rate, the temperature at which the oil first becomes cloudy or hazy in appearance is called cloud point.

"The temperature at which the oil just ceases to flow is called pour point of the oil."

A good Lubricant should possess low cloud & pour point.

Give cloud & Pour point apparatus with explanation

Q. NO.	ANSWER	MARKS

Q.5(b) Flash & Fire point :-
The volatility and the tendency of a lubricating oil to burn is indicated in terms of flash point and fire point. (4.5)

Definition Flash point :- Minimum temperature of an oil, at which the oil gives off sufficient vapour that ignite for a moment, when a flame of specific dimension is brought near to the surface of the oil, under specified conditions.

Fire point :- Minimum temperature at which the oil gives off sufficient vapour that burns continuously for at least 5 seconds, when a flame of specific dimensions is brought near to it under specified conditions.

Generally Fire point of an oil is nearly 5° to 40° higher than its flash point.

A good lubricating oil should have flash and fire point reasonably above the operating temperature of the machine.

This ensures the safety against fire hazards during the use of lubricating oil in the machine.

Determination of flash & fire point :-
Give detailed explanation & Diagram of Pensky-Martin apparatus for determination of flash & fire point.

(c) Viscosity :- Internal Resistance to flow of any liquid offered by its own molecules is called Viscosity.

Q. NO.	ANSWER	MARKS
–	Coefficient of Viscosity (η):-	

$$F = \frac{\eta v}{d} \quad \text{If } v = 1\,cm/s,\ d = 1\,cm.$$

then $\boxed{F = \eta}$

Hence coefficient of Viscosity (η) is defined as the tangential force required per unit area to maintain the unit velocity gradient between two layers which are one cm apart.

Units of Viscosity — Poise / centipoise, N/m^2, Pascals (second)

Measurement apparatus:- Saybolt, ostwald, Redwood viscometer.

Viscosity of good lubricant should not be high or very low it should be moderate.

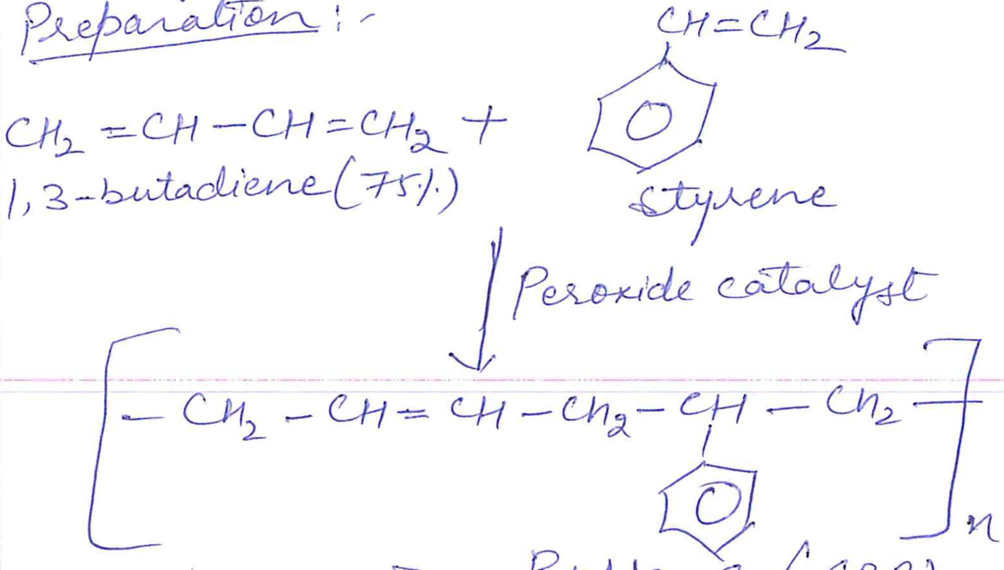
Give Diagram & Explanation of Redwood Viscometer to measure Viscosity in Redwood Seconds. — (4.5)

Q.5 (a) Notes on: Synthetic Rubbers:-

SBR :- Styrene Butadiene Rubber (Buna-S), GR-S

copolymer of 75% butadiene + 25% styrene in an emulsion in presence of peroxide catalyst

Preparation:-



Buna-S (SBR) — (3)

- Give Properties] 5 each.
- Uses

School of Aeronautics (Neemrana)

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MODEL ANSWER PAPER

Name of Examination: _____ Date of Examination: _____

Subject Engg. Chem. Batch _____ Semester _____

Q. NO.	ANSWER	MARKS
Q.6 (b)	**NBR :-** (BuNa-N) GR-N. Copolymer of butadiene or acrylonitrile. 75% butadiene & 25% acrylonitrile (Vinyl Cyanide) in an emulsion system. $CH_2=CH-CH=CH_2$ + $CH_2=CH(CN)$ 1,3-butadiene 75% ; acrylonitrile 25% $\rightarrow \left[-CH_2-CH=CH-CH_2-CH(CN)-CH_2-\right]_n$ ~~OR~~ (NBR or GR-N) Give 5 properties & 5 uses.	8
(c)	**Isoprene :-** (Natural Rubber) Give Process of extraction from latex. **Structure of rubber:-** $n\left(CH_2=C(CH_3)-CH=CH_2\right) \longrightarrow \left[CH_2-C(CH_3)=CH-CH_2\right]_n$ Isoprene 2-methyl-1,3-butadiene Poly Isoprene CH_2, CH_2, C, CH_3, H (Cis-form) Natural Rubber	~~5~~ 3

Q. NO.	ANSWER	MARKS
(d)	Elastomer Structure given in sol^n of Q. 1. (d) Properties & uses. (½ each)	(3)
Q6.	Types of Lubrications:- Role of Lubricant is to reduce frictional forces. Lubrication in machine can be carried out in following ways:- (i) Fluid or Hydrodynamic Lubrication (Thick film) (ii) Thin film or Boundry Lubrication (iii) Extreme pressure Lubrication Fluid or Hydro-dynamic Lubrication:- Details and diagram → In this kind of Lubrication the sliding/moving surfaces are separated from each other by a thick film of Lubricant (at least 1000 A° thick) So that direct surface to surface contact & small asperities does not Interlock. This reduces friction and prevents wear. Load Velocity Lubricant layer. Resistant to movement of moving part is due to internal resistance between the particles of Lubricant moving over each other. So Lubricant	

Q. NO.	ANSWER	MARKS

should have minimum viscosity under working conditions. and at the same time it should remain in its place. and should separate the surfaces.

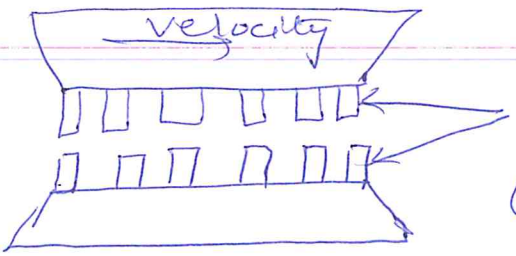
Hence coefficient of friction is as low as 0.001 to 0.3 for fluid film lubricated system.

In unlubricated system its value lies between 0.5 to 1.5, which is very high comparatively

This kind of lubrication takes place in the machines having less load and high speed. eg. sewing machine, calculators, watches etc.

2. Thin film or Boundary lubrication:-

This kind of lubrication is workable in conditions when load is high & speed is low. and viscosity of the oil is very low. The distance between moving/sliding surfaces is very ~~bad~~ small and equivalent to height of asperities. η value is 0.05 to 0.3



Adsorbed thin layer of lubricants (veg. & Animal oil).

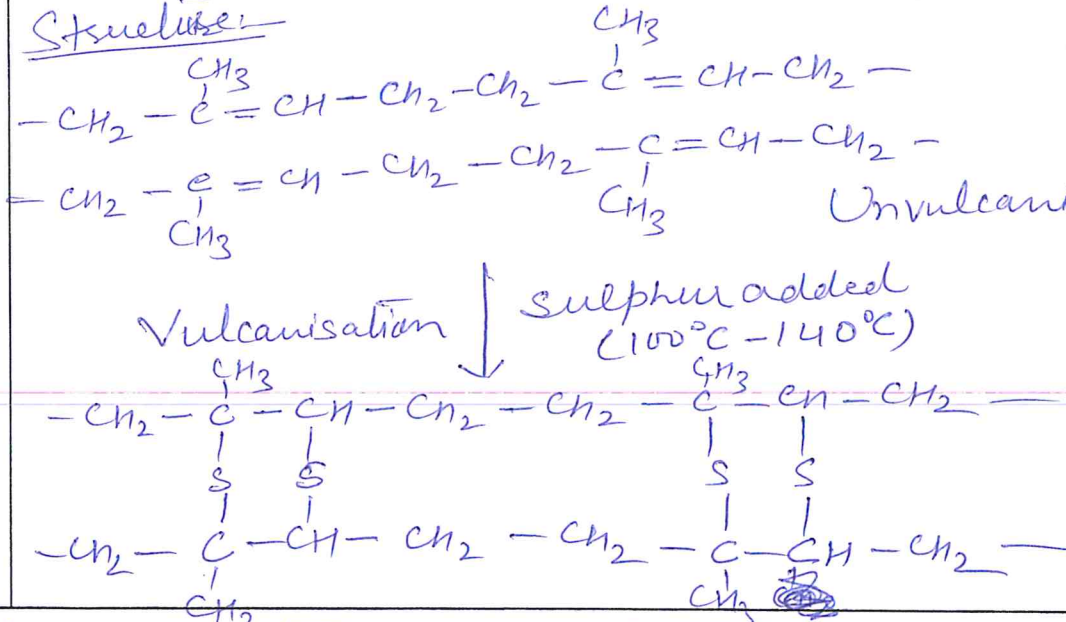
Q. NO.	ANSWER	MARKS

For good boundry lubrication lub. should have
(i) long hydrocarbon chain
(ii) Lateral attraction between the chains.
(iii) Polar group to promote spreading & orientation over the metal surface at high pressure.
(iv) High Viscosity Index.
(v) Resistant to heat and oxidation, Low pour pt; good oiliness
eg- MoS_2, Mineral oil, Veg. & animal oil.

(3) Extreme pressure Lubrication:-
In case moving surfaces are (moving or sliding) under high pressure and speed. Lubricant may decompose or evaporate therefore, additives are added to mineral oil so that lubricant sustain the extreme pressure and Temp. extreme pressure additives are chlorine, sulphur sulphurised oil, Phosphorus (Tsicresyl phosphate) At high temp these additives reacts with metal surface and give Chloride, sulphides layers these can withstand high temp. range between (650-1200°C) Therefore act as good lubricants in extreme pressure and temperature condition. (9)

Q.7 Vulcanisation:- Addition of S to Natural Rubber to upgrade its properties.
Give process →

Structure:-



(9)

Give Advantages.
& Superiority of Rubber

Q. NO.	ANSWER	MARKS

Q.8 Classification of Polymers:-

Polymers can be classified on the bases of following points:

(i) On Bases of Origin
- Natural Polymers. DNA, RNA, Nucleic acids, Proteins, amino acids.
- Synthetic – NBR, SBR, GR-M, etc.

(ii) Chemical Structure
- Homopolymer – Same monomers. Polyethylene, PVC, Teflon
- copolymer – Different monomers. Bakelite, UF, PF-Resins etc.

(iii) Polymeric Structure
- Linear – Polyethylene
- Branched – PVC, PVA.
- Cross linked – Bakelite, UF Resins.

(iv) Chemical composition
- Organic – Any polymer cont. C.
- Inorganic – Silicons.

(v) Tacticity Based
- Isotactic – Regular arrangement of side grps.
- Syndiotactic → Alternate
- Atactic → No regular arrangement of side chain on main chain.

(vi) Thermal Behaviour
- Thermosetting – does not regain shape
- Thermoplastic – Regain their shapes.

(vii) Intermolecular Interactions
- Plastic
- Elastomers.
- Fibers.

(viii) Functionality
- Bifunctional — $-CH_2-CH_2-$ (Polyeth
- Trifunctional — $-CH_2=\underset{Cl}{C}-$ (PVC)
- Poly-functional – crosslinked (PF Resin)

(9)

Note Give details with examples for each classification category

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School of Aeronautics(Neemrana)

I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan

Fortnightly/Term : Mid Term -1 Date : 26. 02. 2018

Subject : **Engg. Physics (Th)** Batch : AE-12 & 14

Faculty Name : Mr. Rinesh T. Semester: II

(Answer any FIVE Questions. All Questions carry equal marks) **Total Marks: 45**

Q.No.	Questions	Unit Name / Topic
1.	Explain the structure of an optical fiber giving their usage. Also explain how light propagates in optical fiber. (9)	Unit No.: Topic Name: Source:
2.	What are Anti-Reflection coatings? Explain the principle of working. Obtain the condition for minimum thickness of such a coating. (9)	Unit No.: Topic Name: Source:
3.	Derive the expression for the maximum acceptance angle and numerical aperture of an optical fiber. (9)	Unit No.: Topic Name: Source:
4.	A glass clad fiber is made with core glass of refractive index 1.5 and the cladding is doped to give a fractional index difference of 0.0005. Determine i. The cladding index ii. The critical angle iii. The Acceptance angle iv. Numerical Aperture (9)	Unit No. Topic Name: Source:

Q.No.	Questions	Unit Name / Topic
5.	Draw labeled diagram of Michelson Interferometer. Explain how it is used to find the wavelength of light. (9)	Unit No.: Topic Name: Source:
6.	A glass microscope lens μ=1.50 is coated with Magnesium Fluoride μ=1.30 film to increase the transmission of normally incident light. What minimum film thickness should be deposited on the lens? (9)	Unit No.: Topic Name: Source:
7.	i) Explain the following terms a. Critical Angle b. Acceptance angle and Acceptance cone c. Numerical Aperture ii) Calculate the numerical aperture, acceptance angle of an optical fibre, having a Refractive index of core 1.52 and refractive index of cladding 1.46. (9)	Unit No.: Topic Name: Source:
8.	i) Find the Reflectivity of glass surface of Refractive index 1.6 when light is incident normally on it. ii) Show that the Refractive index of Antireflection coating should be square root of the Refractive index of the glass/ lens on which it has to be coated. (9)	Unit No. Topic Name: Source:

School of Aeronautics (Neemrana)

I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan

MODEL ANSWER PAPER

Name of Examination: Mid Term-1 Sem-II Date of Examination: 26/2/18

Subject Engg. Physics Batch AE-12,14 Semester II

Q. NO.	ANSWER	MARKS
1.	An Optical Fibee has 3 coaxial components Coee, Cladding and Jacket. CORE - It is the innee most eegion of the fibee. The function of the coee is to teansmit the signal. It is the light guiding eegion. CLADDING - The layee which sueeounds the coee is called cladding. The puepose of cladding is to confine the light within the coee. It is used to guide the light within the coee. Refeactive Index of the cladding must always be less than that of coee. JACKET - The outeemost layee of an optical fibee. The function of jacket is to peotect the fibee feom abeesions, contamination and the haemful influence of moistee. It is used to peovide toghnes and Tensile steength to the fibee.	(9)

SECTION : 12	PAGE NO. : 147
ISSUE NO. : I	ISSUE DATE : 01.08.12
REVISION NO. : 0	REV. DATE : -

Q. NO.	ANSWER	MARKS
	Light is propagated in an Optical Fibre via the principle of Total Internal Reflection. Light rays within the core are continually reflected at the core-cladding boundary so that the rays remain within the core. Thus information is transmitted down the fiber lines efficiently without any loss of data.	
2.	Anti-Reflection coatings are coatings used to reduce the loss of light due to Reflection. A coating of thin transparent Dielectric material is done over the glass surface which acts as anti-reflection coating. The Refractive Index of the coating must be greater than the refractive index of the external medium and smaller than the substrate Principle → It works on the principle of Interference. The light reflected from the top and bottom surfaces of the coating are 180° out of phase with each	(9)

Q. NO.	ANSWER	MARKS

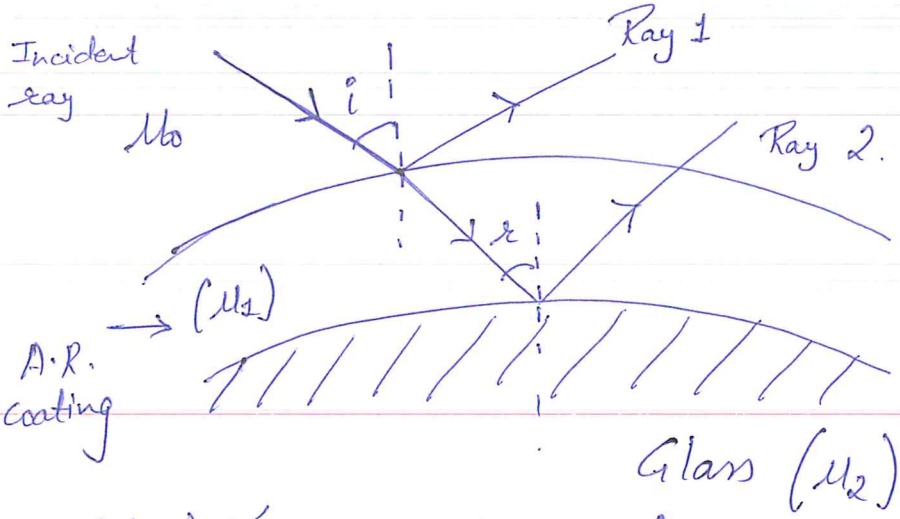
other and interfere Destructively.

Condition for Minima Thickness

Let μ_0 be the Refractive index of medium

μ_1 be the Refractive index of Anti-Reflection coating

μ_2 be the Refractive index of Glass



Let 't' be thickness of Anti-Reflection coating.

PHASE CONDITION - The wave reflected from the top and bottom surface of thin film should be opposite in phase so that they cancel each other by Destructive Interference.

Q. NO.	ANSWER	MARKS

Path Difference b/w Ray 1 and Ray 2

$$\Delta = 2\mu_2 t \cos r - \frac{\lambda}{2} - \frac{\lambda}{2}$$

For normal incidence $\cos r = 1$.

$$\Delta = 2\mu_2 t - \lambda \rightarrow (1)$$

Addition or Subtraction of λ in path difference does not affect anything, it just shifts the phase., so it can be ignored.

Now, for Destructive Interference

$$\Delta = (2n+1)\frac{\lambda}{2} \rightarrow (2).$$

Equating (1) and (2), we get.

$$(2n+1)\frac{\lambda}{2} = 2\mu_2 t.$$

$$\frac{(2n+1)\lambda}{4\mu_2} = t$$

For minimum thickness $n = 0$.

So

$$\boxed{t_{min} = \frac{\lambda}{4\mu_2}}$$

Q. NO.	ANSWER	MARKS
Q3.	Let us consider a cylinderical fiber consisting of an inner core of refractive index 'μ_1' and cladding of refractive index 'μ_2'. Let 'μ_0' be the refractive index of the medium from which the light ray enters the fiber Let a ray 'OA' be incident at an angle 'i' to the axis of fiber and 'r' be the angle of refraction and strikes the core-cladding interface at an angle ϕ. For Total Internal Reflection $\phi \geq \theta_c$ (critical angle).	

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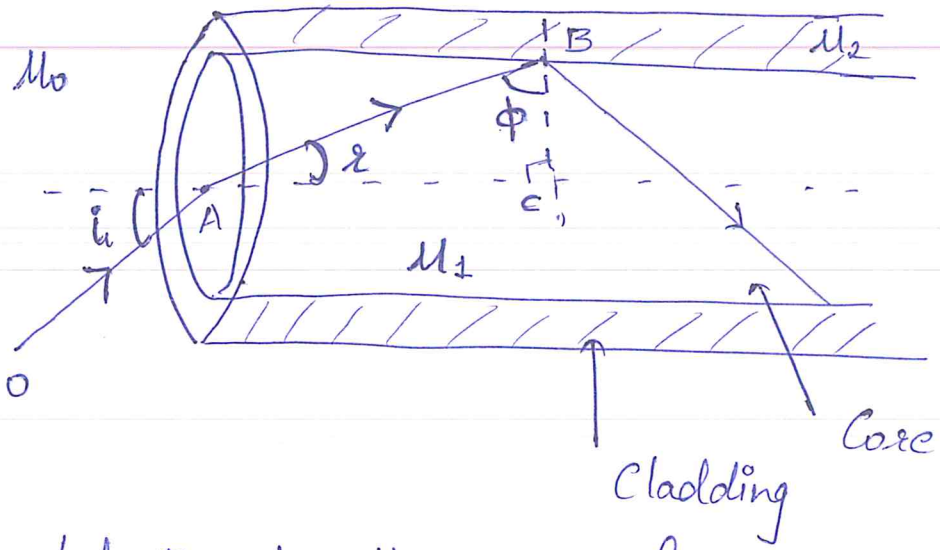
I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan

MODEL ANSWER PAPER

Name of Examination: Mid Term 1 (Sem-II) Date of Examination: 26/2/18

Subject Engg. Physics Batch AE-12, 14 Semester II

Q. NO.	ANSWER	MARKS
3.	(Contd.).  Let BC be the normal. According to Snell's Law $\mu_0 \sin i = \mu_1 \sin r$ $\frac{\sin i}{\sin r} = \frac{\mu_1}{\mu_0} \rightarrow (1)$ In ΔABC. $\phi = 90^\circ - r$. $r = 90^\circ - \phi$ $\sin r = \sin(90^\circ - \phi)$ $= \cos\phi \rightarrow (2)$	(9)

Q. NO.	ANSWER	MARKS

Using (2) in (1)

$$\sin i = \frac{\mu_1}{\mu_0} \cos\phi \rightarrow (3)$$

Critical angle $(\theta_c) = \sin^{-1}\left(\frac{\mu_2}{\mu_1}\right) \rightarrow (4)$

when $\phi = \theta_c$, $i = i_{max}$

so $\sin i_{max} = \frac{\mu_1}{\mu_0} \cos\theta_c$.

From (4)

$$\sin i_{max} = \frac{\mu_1}{\mu_0} \sqrt{1 - \sin^2\theta_c}$$

$$= \frac{\mu_1}{\mu_0} \sqrt{1 - \left(\frac{\mu_2}{\mu_1}\right)^2}$$

$$\sin i_{max} = \frac{\sqrt{\mu_1^2 - \mu_2^2}}{\mu_0}$$

$$\boxed{i_{max} = \sin^{-1}\left[\frac{\sqrt{\mu_1^2 - \mu_2^2}}{\mu_0}\right]}$$

Acceptance Angle.

Q. NO.	ANSWER	MARKS

Numerical Aperture → It is defined as sine of Acceptance angle.

$$N.A. = \sin i_{max}^{\circ}$$

$$N.A. = \frac{\sqrt{\mu_1^2 - \mu_2^2}}{\mu_0}$$

4. (Given) $\mu_1 = 1.5$ and $\Delta = 0.0005$ (9)

To find

(i) Cladding Index (μ_2)

(ii) Critical Angle (θ_c)

(iii) Acceptance Angle (i_{max}°)

(iv) Numerical Aperture (NA)

Sol^n

(i) As $\Delta = \frac{\mu_1 - \mu_2}{\mu_1}$.

$$0.0005 = \frac{1.5 - \mu_2}{1.5}$$

$$\mu_2 = 1.5 - (1.5 \times 5 \times 10^{-4})$$

$$\mu_2 = 1.4925$$

Q. NO.	ANSWER	MARKS

(ii) Critical angle (θ_c) is defined as

$$\sin\theta_c = \frac{\mu_2}{\mu_1}$$

$$\theta_c = \sin^{-1}\left(\frac{\mu_2}{\mu_1}\right)$$

$$= \sin^{-1}\left(\frac{1.4925}{1.5}\right)$$

$$= \sin^{-1}(0.9995)$$

$$\theta_c = 88.2^\circ$$

(iii) Acceptance angle (i_{max}) in a fiber is given by the relation

$$i_{max} = \sin^{-1}\left[\frac{\sqrt{\mu_1^2 - \mu_2^2}}{\mu_0}\right]$$

where $\mu_0 = 1$.

So $$i_{max} = \sin^{-1}\left[\frac{\sqrt{(1.5)^2 - (1.4925)^2}}{1}\right]$$

$$i_{max} = \sin^{-1}\left(\sqrt{0.0225}\right) = 8.6^\circ$$

Q. NO.	ANSWER	MARKS
	(iv) Numerical Aperture (N.A) = $\sin i_{max}$ $N.A. = \sqrt{\mu_1^2 - \mu_2^2}$ $= \sqrt{0.0225}$ $N.A. = 0.0474.$	

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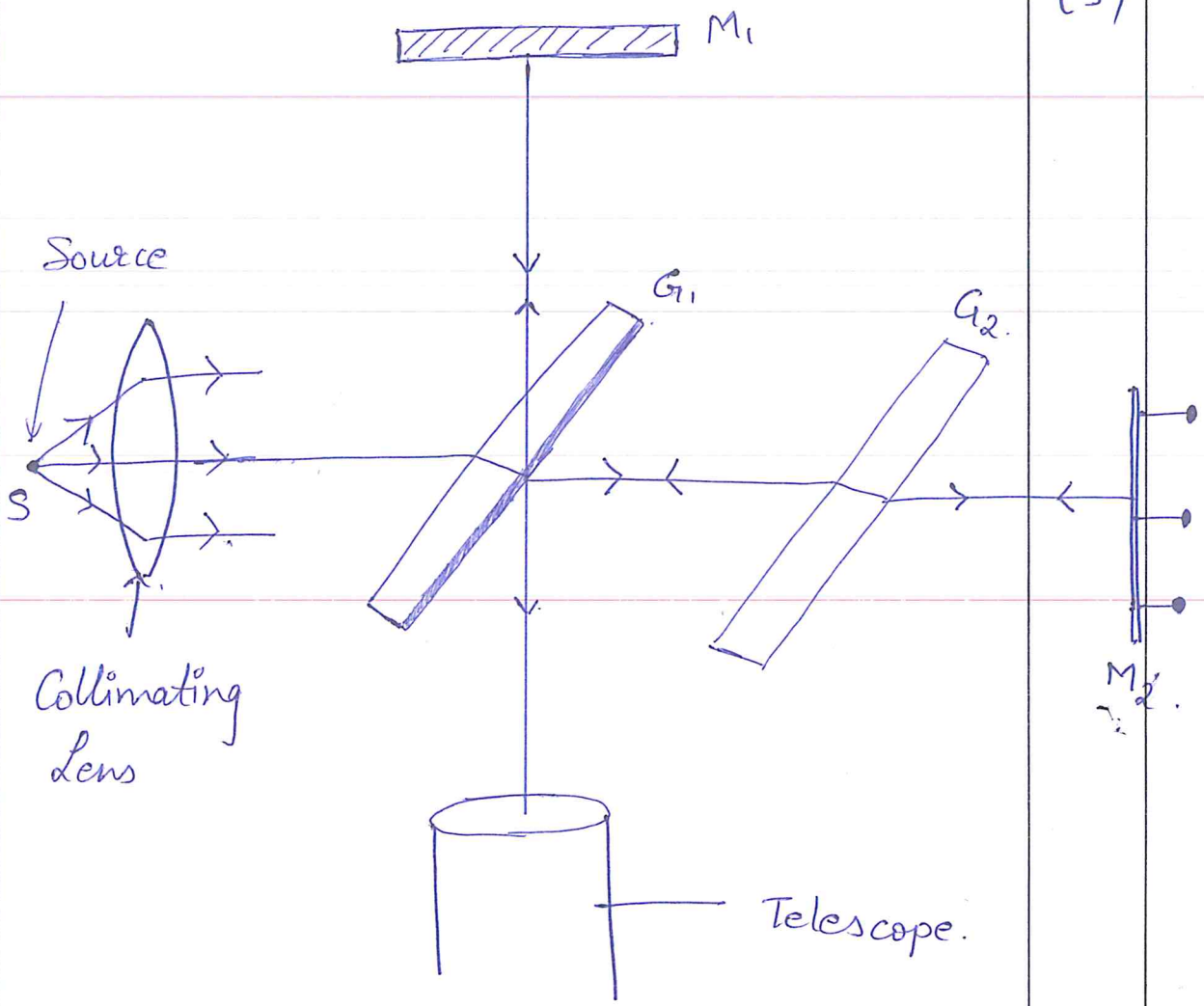
School of Aeronautics (Neemrana)
I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan

MODEL ANSWER PAPER

Name of Examination: Mid Term 1 (Sem II) Date of Examination: 26/2/18

Subject Engg. Physics Batch 12, 14 Semester II

Q. NO.	ANSWER	MARKS
5.	(i)	(9)



→ M_1, M_2 ⇒ Mirrors

→ G_1, G_2 ⇒ Glass plates.

→ G_1 is half silvered at its rear end It is called a Beam Splitter

Q. NO.	ANSWER	MARKS

→ G_2 is called a Compensating Plate

→ Glass plate G_1 and G_2 both are made of same material and are of equal thickness

(ii) Measurement of wavelength of light using Michelson Interferometer.

* Mirrors M_1 and M_2 in Michelson Interferometer are made perpendicular to each other to get circular fringes.

* Let the separation between the two mirrors be such that n^{th} dark fringe is obtained at the center

i.e $2d\cos\theta = n\lambda$

For central fringe $\cos\theta = 1$;

d: separation b/w the two mirrors.

$$2d = n\lambda$$

Adding λ on both sides

$$2\left(d + \frac{\lambda}{2}\right) = (n+1)\lambda$$

Q. NO.	ANSWER	MARKS

Thus, on moving mirror M_1 by a distance $\frac{\lambda}{2}$, one fringe shifts in the field of view.

* Let M_1 is moved by a distance 'x' and no. of fringes shifted be 'N'

$\because$ if M_1 moves by $\frac{\lambda}{2}$ distance, then no. of fringes shifted = 1.

$\therefore$ On moving mirror M_1 by x distance, No. of fringes shifted is $= \frac{1}{\lambda/2} \cdot x$.

$$N = \frac{x}{\lambda/2} \Rightarrow 2x = N\lambda$$

$$\boxed{\lambda = \frac{2x}{N}}$$

Thus by knowing the distance 'x' moved by mirror M_1 and counting the no. of fringes (N), wavelength (λ) can be calculated.

Q. NO.	ANSWER	MARKS

6. (Given) $\mu_g = 1.50$, $\mu_f = 1.30$, $\lambda = 5800\text{Å}$

To find : Thickness of film (t). (3)

Sol^n

In Anti-Reflection coating, the path difference (Δ) is given as

$$\Delta = 2\mu_f t \cos r.$$

where μ_f = Refractive Index of film

t = Thickness of film

Let $\cos r = 1$ (for Normal Incidence)

$$\Delta = 2\mu_f t.$$

For Minima.

$$2\mu_f t = (2n+1)\frac{\lambda}{2}.$$

For minimum thickness. ($n = 0$)

$$\therefore t_{min} = \frac{\lambda}{4\mu_f}.$$

$$t_{min} = \frac{5800\text{ Å}}{4 \times 1.30} = \underline{1115.384\text{ Å}}$$

Q. NO.	ANSWER	MARKS
7.	(i) a) Critical Angle It is the angle by which light must be incident at the interface separating denser and rarer medium such that the incident light undergoes total internal reflection. Light has to travel from Denser to Rarer medium b) Acceptance Angle The maximum angle by which light must be incident in the optical fiber such that it undergoes Total Internal Reflection. Acceptance Cone → The light rays contained within the cone having a full angle ($2\theta_{max}$) are accepted and transmitted. This cone is called Acceptance Cone	

Note

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MODEL ANSWER PAPER

Name of Examination: Mid Term 1 (Sem-II) Date of Examination: 26/2/18

Subject Engg. Physics Batch 12, 14 Semester II

Q. NO.	ANSWER	MARKS
7.	(Contd.).	
	c) Numerical Aperture.	(9)
	– It is defined as the Light Gathering power of an Optical Fiber which is equal to Sine of Acceptance Angle.	
	(ii) (Given) μ_1 (Refractive Index = 1.52 of core)	
	μ_2 (Refractive Index of Cladding) = 1.46	
	To find : a) Numerical Aperture	
	b) Acceptance Angle	
	Sol^n	
	a) $N.A. = \frac{\sqrt{\mu_1^2 - \mu_2^2}}{\mu_0}$	
	$= \sqrt{(1.52)^2 - (1.46)^2}$	
	$= 0.4228$	

Q. NO.	ANSWER	MARKS

b) $i_{max} = \sin^{-1}(N.A.)$

$= \sin^{-1}(0.4228)$

$i_{max} = 25.011^{\circ}$

8. (i) (Given) $\mu_g = 1.6$; $\mu_a = 1$.

To find: Reflectivity of Glass surface

Sol^{n} (9)

Reflectivity of glass surface is given as

$$R = \left(\frac{\mu_2 - \mu_1}{\mu_2 + \mu_1}\right)^2.$$

where μ_2 is the Refractive Index of the material from which light gets reflected.

μ_1 = Refractive Index of the medium in which light is travelling

Q. NO.	ANSWER	MARKS

So $R = \left(\frac{\mu_g - \mu_a}{\mu_g + \mu_a}\right)^2$.

$= \left(\frac{1.6 - 1}{1.6 + 1}\right)^2$

$= \left(\frac{0.6}{2.6}\right)^2$.

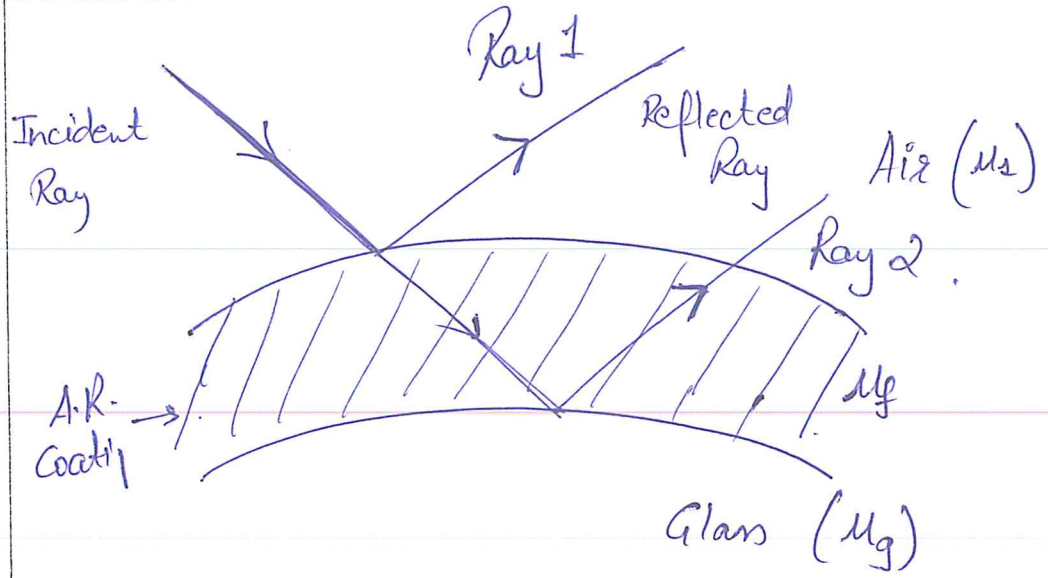
$R = 0.0532$

(ii) Let μ_g be the Refractive index of the substrate

μ_f be the Refractive Index of the Anti-Reflection coating

μ_1 : Refractive Index of external medium.

Q. NO.	ANSWER	MARKS



The light reflected from top and bottom surface of coating should be opposite in phase and must be of equal amplitude for equal Amplitude.

Reflectivity of thin film w.r.t Air = Reflectivity of Glass w.r.t film

$$\text{So. } \left(\frac{\mu_f - \mu_1}{\mu_f + \mu_1}\right)^2 = \left(\frac{\mu_g - \mu_f}{\mu_g + \mu_f}\right)^2$$

$$(\mu_f - \mu_1)\cdot(\mu_g + \mu_f) = (\mu_g - \mu_f)\cdot(\mu_f + \mu_1)$$

$$\cancel{\mu_f \mu_g} + \mu_f^2 - \mu_1 \mu_g - \cancel{\mu_1 \mu_f} = \cancel{\mu_g \mu_f} + \mu_g \mu_1 - \mu_f^2 - \cancel{\mu_f \mu_1}$$

Q. NO.	ANSWER	MARKS

$$\mu_f^2 = \mu_1 \mu_g$$

$$\boxed{\mu_f = \sqrt{\mu_1 \mu_g}}$$

Since external medium is Air, so $\mu_1 = 1$

i.e. $\boxed{\mu_f = \sqrt{\mu_g}}$

⇒ Refractive Index of film must be square root of Refractive Index of substrate on which it has to be coated.

Note

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Annexure No. SA/14

School of Aeronautics(Neemrana)

I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan

Fortnightly/Term : Mid Term -1 Date : 26. 02. 2018

Subject : **Comp. Prog. (Th)** Batch : AE-12,13,14&MT-3

Faculty Name : Mr. Rajendra Singh Semester: II

(Answer any FIVE Questions. All Questions carry equal marks) **Total Marks: 45**

Q.No.	Questions	Unit Name / Topic
1.	Give C statement for performing inputting a string? (9)	Unit No.: Topic Name: Source:
2.	Write a program which will read a line and count all occurrences of "college "in that line. Draw a flowchart for this problem. (9)	Unit No.: Topic Name: Source:
3.	How do you create array using dynamic memory allocation ?Give example and also list benefits of this scheme? (9)	Unit No.: Topic Name: Source:
4.	Explain the use of & and * operator used with pointer? (9)	Unit No. Topic Name: Source:

Q.No.	Questions	Unit Name / Topic
5.	What is array? What are the advantages of array? Write a program to find maximum value from n values in array. (9)	Unit No.: Topic Name: Source:
6.	Write short note on passing an array to a function? (9)	Unit No.: Topic Name: Source:
7.	What is pointer? Discuss advantages of pointer? (9)	Unit No.: Topic Name: Source:
8.	WAP to reverse a string word wise: **Input:** SOA IS THE TOP INSTITUTE IN INDIA **Output:** INDIA IN INSTITUTE TOP THE IS SOA (9)	Unit No. Topic Name: Source:

School of Aeronautics (Neemrana)

I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan

MODEL ANSWER PAPER

Name of Examination: Mid Term - 1 Date of Examination: 27.02.2018

Subject Comp. Prog. - II Batch 12,13,14 &MT-3 Semester II

Q. NO.	ANSWER	MARKS
Ans. 1.	**String is an array of characters.** In this guide, we learn how to declare strings, how to work with strings in C programming and how to use the pre-defined string handling functions. We will see how to compare two strings, concatenate strings, copy one string to another & perform various string manipulation operations. We can perform such operations using the pre-defined functions of "string.h" header file. In order to use these string functions you must include string.h file in your C program. **String Declaration** String Declaration 1) char str1[]={'A', 'B', 'C', 'D', '\0'}; 2) char str1[]="ABCD"; ⇩ '\0' would automatically insterted at the end in this type of declaration **Method 1:** charaddress[]={'T', 'E', 'X', 'A', 'S', '\0'};	

Ans 2.	#include<stdio.h>
	#include<conio.h>
	#include<string.h>
	void main()
	{
	inti=0,j=0,count=0;
	char str1[100],str2[20],str3[20];
	clrscr();
	printf("Enter the text: ");
	gets(str1);	

Q. NO.	ANSWER	MARKS

```
printf("Enter word to count: ");gets(str2);

while(str1[i]!='')
{
while(str1[i]!=' '&&str1[i]!='') //copying the word from the text to a new string
str3[j++]=str1[i++];
str3[j]=''; //assigning null character at the end of string
j=0;
if((strcmpi(str2,str3))==0) //comparing the given word with the copied word
count++;
if(str1[i]=='')
break;
else
i++;
}
printf("No. of words are %d",count);
getch();
}
```

Ans 3.

As you know, you have to declare the size of an array before you use it. Hence, the array you declared may be insufficient or more than required to hold data. To solve this issue, you can allocate memory dynamically.

Dynamic memory management refers to manual memory management. This allows you to obtain more memory when required and release it when not necessary.

Although C inherently does not have any technique to allocate memory dynamically, there are 4 library functions defined under <stdlib.h> for dynamic memory allocation.

Function Use of Function

malloc()	Allocates requested size of bytes and returns a pointer first byte of allocated space
calloc()	Allocates space for an array elements, initializes to zero and then returns a pointer to memory
free()	deallocate the previously allocated space
realloc()	Change the size of previously allocated space

C malloc()

The name malloc stands for "memory allocation".

The function malloc() reserves a block of memory of specified size and return a pointer of type void which can be casted into pointer of any form.

Syntax of malloc()

Q. NO.	ANSWER	MARKS

	ptr = (cast-type*) malloc(byte-size)
	
	Here, ptr is pointer of cast-type. The malloc() function returns a pointer to an area of memory with size of byte size. If the space is insufficient, allocation fails and returns NULL pointer.
	
	ptr = (int*) malloc(100 * sizeof(int));
	
	This statement will allocate either 200 or 400 according to size of int 2 or 4 bytes respectively and the pointer points to the address of first byte of memory.
	
	C calloc()
	The name calloc stands for "contiguous allocation".
	
	The only difference between malloc() and calloc() is that, malloc() allocates single block of memory whereas calloc() allocates multiple blocks of memory each of same size and sets all bytes to zero
	.
	Syntax of calloc()
	ptr = (cast-type*)calloc(n, element-size);
	
	This statement will allocate contiguous space in memory for an array of n elements. For example:
	
	ptr = (float*) calloc(25, sizeof(float));
	
	This statement allocates contiguous space in memory for an array of 25 elements each of size of float, i.e, 4 bytes.
	
	C free()
	Dynamically allocated memory created with either calloc() or malloc() doesn't get freed on its own. You must explicitly use free() to release the space.
	
	syntax of free()
	free(ptr);
	
	This statement frees the space allocated in the memory pointed by ptr.
	
	Example #1: Using C malloc() and free()
	
	Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc() function.	

Q. NO.	ANSWER	MARKS

```
#include<stdio.h>
#include<stdlib.h>

intmain()
{
intnum, i, *ptr, sum = 0;

printf("Enter number of elements: ");
scanf("%d", &num);

ptr = (int*) malloc(num * sizeof(int)); //memory allocated
using malloc
if(ptr == NULL)
    {
printf("Error! memory not allocated.");
exit(0);
    }
printf("Enter elements of array: ");
for(i = 0; i<num; ++i)
    {
scanf("%d", ptr + i);
        sum += *(ptr + i);
    }

printf("Sum = %d", sum);
    free(ptr);
return0;
}
```

Ans. 4. **Pointer Operator in C Program :**

Operator	Operator	Name Purpose
*	Value at Operator	Gives Value stored at Particular address
&	Address Operator	Gives Address of Variable

In order to create pointer to a variable we use "*" operator and to find the address of variable we use "&" operator.

[box] Don't Consider "&" and "*" operator as Logical AND and Multiplication Operator in Case of Pointer.

Q. NO.	ANSWER	MARKS
	1. '&' operator is called as address Operator 2. '*' is called as **'Value at address'** Operator 3. **'Value at address'** Operator gives 'Value stored at Particular address. 4. **'Value at address'** is also called as **'Indirection Operator'**	

Ans. 5.	C program to find minimum or the smallest element present in an array. It also prints the location or index at which minimum element occurs in the array. Our algorithm assumes the first element as minimum and then compare it with other elements if an element is smaller than it then it becomes the new minimum, and this process is repeated till complete array is scanned.
	
	C programming code
	
	#include <stdio.h>
	intmain()
	{
	location = c+1;
	}
	}
	
	printf("Minimum element is present at location %d and it's value is %d.\n", location, minimum);
	return0;
	}	

Ans. 6.	#include<stdio.h>
	voidprint(int *arr[], int s1, int s2) {
	inti, j;
	for(i = 0; i<s1; i++)
	for(j = 0; j<s2; j++)
	printf("%d, ", *((arr+i)+j));
	}
	
	intmain() {
	inta[4][4] = {{0}};
	print(a,4,4);
	}	

Ans. 7.	A pointer is a variable that contains an address which is a location of another variable in memory. Since a pointer is a variable, its value is also stored in the memory in another location. Suppose we assign the address of quantity to a variable p. The link between the variables p and quantity can be visualized as shown in the figure.	

Q. NO.	ANSWER	MARKS

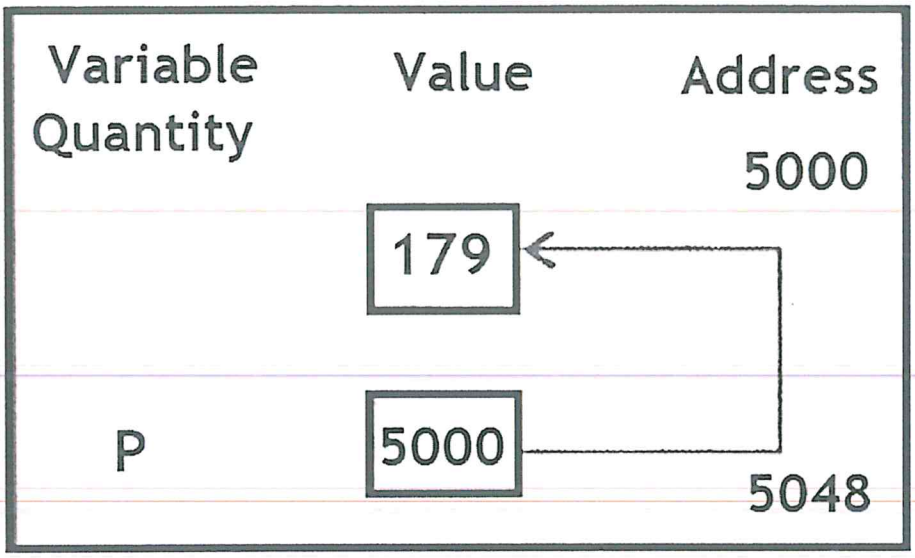

Fig : Pointer as as variable

1. The address of p is 5048. Since the value of variable p is the address of the variable quantity, we may access the value of a quantity by using the value of p and therefore, we say that the variable p points to the variable quantity. Thus, p gets the name 'pointer'.

2. **Advantages :**
3. Pointers reduce the length and complexity of a program.
4. They increase execution speed.
5. A pointer enables us to access a variable that is defined outside the function.
6. Pointers are more efficient in handling the data tables.
7. The use of a pointer array of character strings results in saving of data storage space in memory.

8. **/ * Accessing variables using Pointers*/ :**

```
1.   main ()
2.
3.   {
4.
5.   int x, y;
6.
7.   int*ptr;
8.
9.   x =10;
10.
```

Q. NO.	ANSWER	MARKS

```
11.  ptr=&x
12.
13.  y =*ptr;
14.
15.  printf("value of x is% d \n \n", x);
16.  printf("%d is stored at addr% u \ n", x,&x);
17.
18.  printf("%d is stored at addr% u \n",*&x,&x);
19.
20.  printf("%d is stored at addr% u \n'\ y,&*ptr);
21.
22.  printf("%d is stored at addr% u \n",ptr,&ptr);
23.
24.  }
```

Ans. 8.

```
1.   /*
2.    * C Program to Reverse every Word of given String
3.    */
4.   #include <stdio.h>
5.   #include <string.h>
6.
7.   voidmain()
8.   {
9.   inti, j =0, k =0, x,len;
10.  charstr[100], str1[10][20], temp;
11.
12.  printf("enter the string :");
13.  scanf("%[^\n]s",str);
14.
15.  /* reads into 2d character array */
16.  for(i=0;str[i]!='\0';i++)
17.  {
18.  if(str[i]==' ')
19.  {
20.  str1[k][j]='\0';
21.  k++;
22.          j=0;
23.  }
24.  else
25.  {
26.  str1[k][j]=str[i];
27.  j++;
28.  }
29.  }
30.  str1[k][j]='\0';
31.
```

Q. NO.	ANSWER	MARKS

	9. /* reverses each word of a given string */
	10. for(i=0;i<=k;i++)
	11. {
	12. len=strlen(str1[i]);
	13. for(j =0, x =len-1;j<x;j++,x—)
	14. {
	15. temp = str1[i][j];
	16. str1[i][j]= str1[i][x];
	17. str1[i][x]= temp;
	18. }
	19. }
	20. for(i=0;i<=k;i++)
	21. {
	22. printf("%s ", str1[i]);
	23. }
	24. }	

Note

Dated 06.03.2018 . Signature of Paper Setter Signature of Principal/HOD

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only 5 Questions

Annexure No. SA/14

School of Aeronautics(Neemrana)

I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan

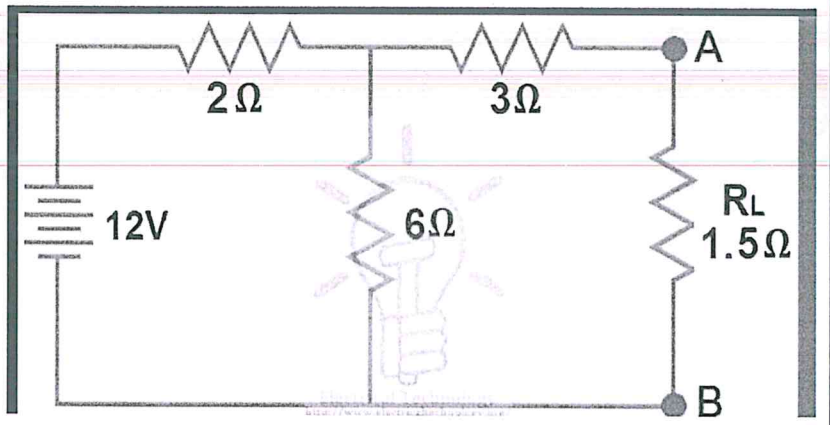
Fortnightly/Term : Mid Term -1 Date : 27. 02. 2018

Subject : Basic Electrical Electronics Engg. (Th) Batch : AE-12,13,14 & MT-3

Faculty Name : Mr. Tushar & Mr. Kuldeep Singh Semester: II

(Answer any FIVE Questions. Two Questions are compulsory from each section. All Questions carry equal marks) **Total Marks: 45**

Q.No.	Questions Section A	Unit Name / Topic
1.	What is avalanche process and zener process and how break down is happening in diode. (9)	Unit No.: Topic Name: Source:
2.	Define zener diode with its symbol and its I-v characteristics. (9)	Unit No.: Topic Name: Source:
3.	Define working of zener diode as a shunt regulator with proper operation. (9)	Unit No.: Topic Name: Source:
4.	Define the term rectifier and proper operation of half wave rectifier with proper pulses. (9)	Unit No. Topic Name: Source:

Q.No.	Questions Section B	Unit Name / Topic
5.	Explain E.m.f Equation of transformer. (9)	Unit No.: Topic Name: Source:
6.	Explain phasor diagram of inductive load to a transformer. (9)	Unit No.: Topic Name: Source:
7.	Explain the equivalent circuit diagram of transformer. (9)	Unit No.: Topic Name: Source:
8.	Using Norton theorem find out Norton current current through load resistance RL 1.5 ohm value.  (9)	Unit No. Topic Name: Source:

School of Aeronautics (Neemrana)

I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan

MODEL ANSWER PAPER

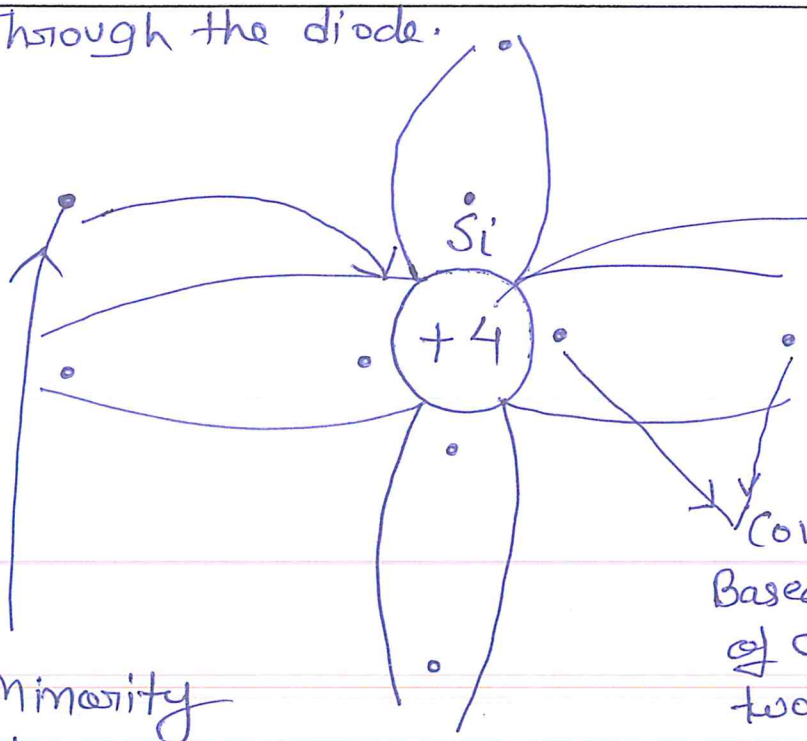
Name of Examination: Midterm – I Date of Examination: 27/02/18

Subject BEEE Batch 12,13,14, MT-3 Semester II

Q. NO.	ANSWER	MARKS
	Sec-A	
1.	Avalanche Process is IN diode Breakdown is happen due to two Process i) Avlanche Process, ii) Zener Process, Avlanche Process occurs in Lightly dopped diode at Large Reverse Voltage. We Know in Reverse Bias Current is due to only Minority charge Carriers which are temp Sensisitive. But due to Very Large Reverse Voltage these Minority charge Carrier will travel at Very high Speed which Posses high amount of Kinetic energy and this Pace of Minority charge Carriers will Collide to Semiconductor atom, which break the Co-valent Bond, & due to this Breaking of Co-valent Bond Majority charge Carrier will also be a Part of flow of Current in Breakdown Process, this Creation of electron-Hole Pairs is Known as Impact Ionization. In Breakdown heavy Current is flow	

Q. NO.	ANSWER	MARKS

Through the diode.



Semiconductor atom Si(14) 2,8,4

Covalent Bond Based on Sharing of charges b/w two Neighbour Semiconductor atom.

Minority Charge Carriers Collide to S.C atom due to application of Large Revers Voltage.

ii) Zener Process :- Zener Process is a other type of Category Responsible for Break-down in diode (which is hareilly dopped but has Medium Reverse Voltage). highlly dopped means Narrow depletion Region which Leads to Maximum Electric field Present, which Leads to Break the Covalent Bond Leads to Create electron & hole pairs. This Leads to Breakdown means Current is only due to Both Minority & Majority Charge Carriers.

Q. NO.	ANSWER	MARKS

$$W = W_n + W_p = \sqrt{\frac{2\varepsilon V_B}{e}\left(\frac{1}{N_A} + \frac{1}{N_D}\right)}$$

$\left\{ W \propto \frac{1}{\sqrt{N_A, N_D}} \right\}$ depletion Region of diode.

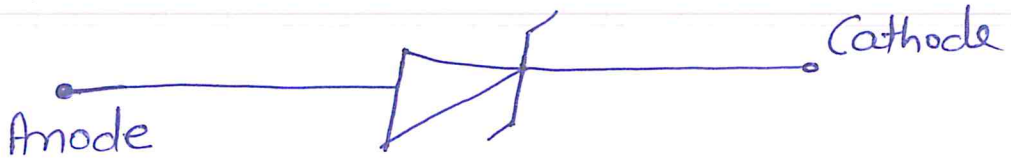
$\left\{ E \propto \frac{1}{W} \right\}$ electric field.

generally we avoid the Break-down in diode But in some application Like Zener diode as Shunt Regulater we used Zener diode in Breakdown.

(END)

2) Zener diode is is also known as Avlanche diode, Breakdown diode.

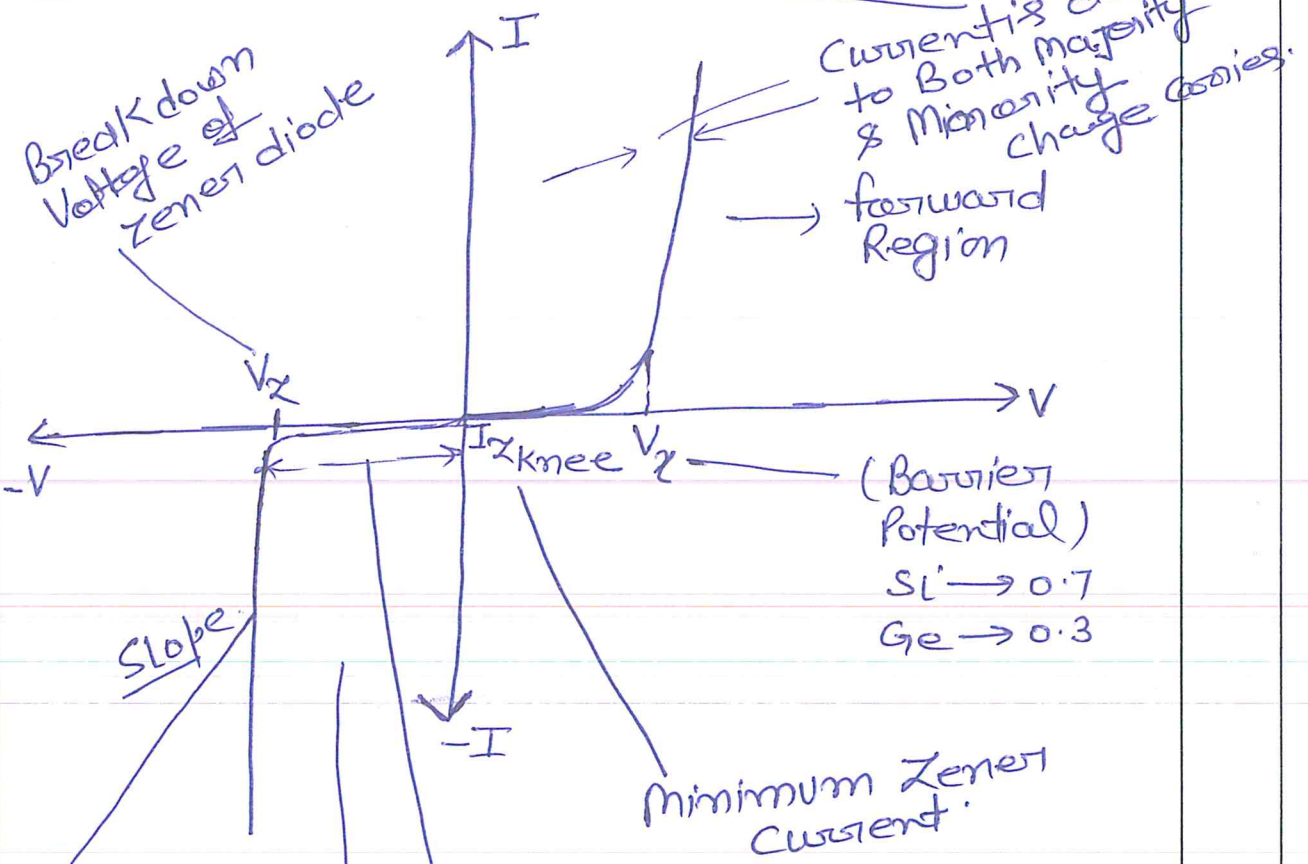
In Zener diode generally Breakdown is happen due to Zener Process. Zener diode is work Same as Normal P-n junction diode in forward Biased But we used Zenerdiode in Break-down state for its Application.



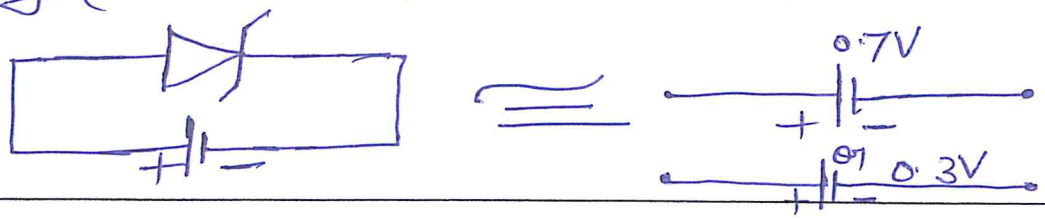
Zener-diode Symbol

Q. NO.	ANSWER	MARKS

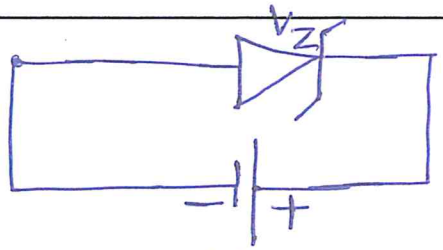
I–V characteristics of Zener diode :→



In forward Bias Zener diode Behave as Short CKt If Ideal and If Practical It will Behave as Constant Voltage Source of (0.7V → Si, 0.3V → Ge).



Q. NO.	ANSWER	MARKS



Reverse Biase Condition

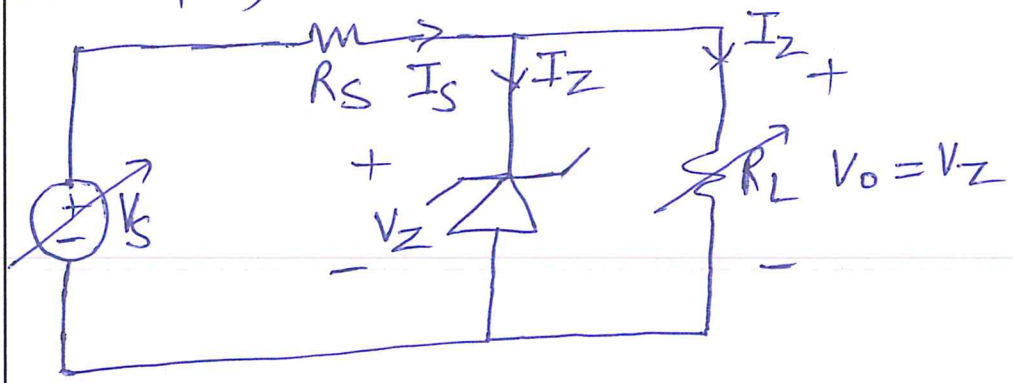
If $V > V_Z$
Leads to open circuit

If $V < V_Z$ ⟶ Break down Condition.
⇓
Leads to Constant Voltage source of V_Z (Voltage).

(END)

3) Zener diode as a Shunt Regulator:

Zener diode is a special Purpose diode which can be used as a Regulator (Constant dc output) in Breakdown Region.



$\{I_S = I_Z + I_L\}$

Q. NO.	ANSWER	MARKS
	Shunt means Zener diode is Connected in Shunt across the Load. In Zener diode as Shunt Regulator, $V_o = V_z$, R_s = Current Limiting Resistor, which Prevents heavy Current flow through Zener diode. V_s = fluctuating dc Supply R_L = Load Resistance $I_{Zknee} = I_{Zmin}$ = minimum amount of Current through Zener diode, Ideally it should be zero. * In Line-Regulation & Load Regulation we are getting ($V_o = V_z$) in Both Cases due to the Property of Zener diode means in Break down Current may Increase or decrease but V_z is Constant. * $-V_s + I_s R_s + V_z = 0$ (KVL around the Loop) $\{V_s = I_s R_s + V_z\}$	

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Dated _____ . **Signature of Paper Setter** **Signature of Principal/HOD**

School of Aeronautics (Neemrana)
I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan

MODEL ANSWER PAPER

Name of Examination: Midterm-I Date of Examination: 27/02/18

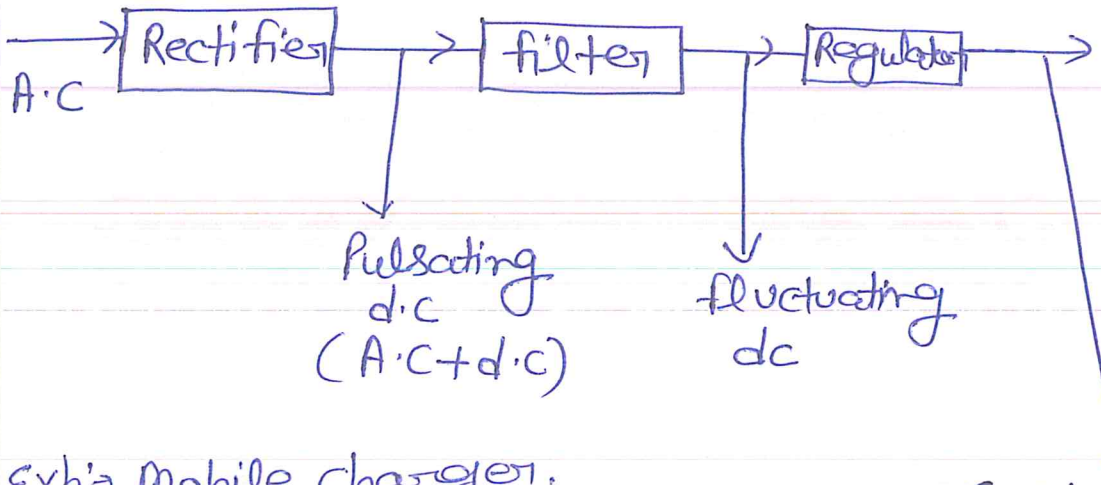
Subject BEEE Batch 12,13,14, MT-2 Semester II

Q. NO.	ANSWER	MARKS
	$I_S = \frac{V_S - V_Z}{R_S}$, $\{I_S = I_{Z_{knee}} + I_{L_{max}}\}$ or $\{I_S = I_{Z_{max}} + I_{L_{min}}\}$	
	$\{V_S \geq (I_{Z_{knee}} + I_{L_{max}}) R_S + V_Z\}$	
	Minimum Supply Voltage for proper operation of Circuit.	
	$\{P_Z = V_Z \times I_Z\}$.	
	→ In Line Regulation means (V_S is Variable but $V_o = V_Z$) ✗.	
	→ In Load Regulation (I_L is Varying) But $V_o = V_Z$ Constant. ✗.	
	(END).	

Q. NO.	ANSWER	MARKS

4. **Rectifier:-** It is device which is used to convert Bidirectional waves into unidirectional waves. (Not Preciselly we can say It Convert A·C ⟶ D·C).

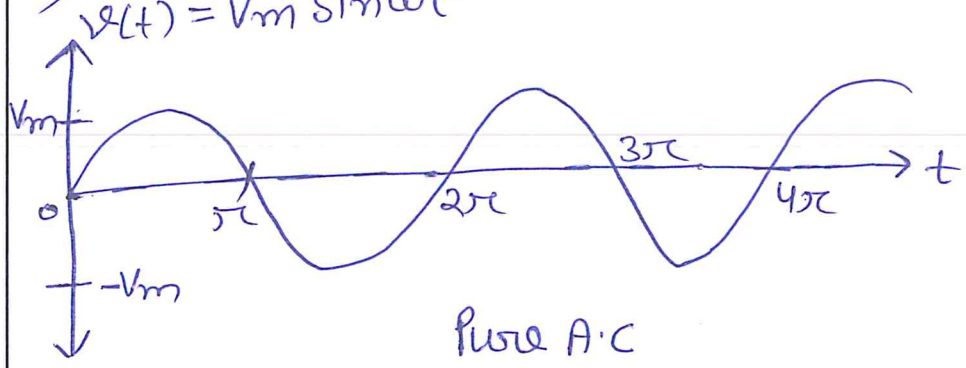
Example of Power Supply:-



Exp:- Mobile charger.

→ **Characteristics of Pure A·C:-**

i) Periodicity ($V(t) = V(t+T)$) — T is period
ii) Zero average Value (means DC component is zero).
iii) No Harmonics is Present.
iv) Bidirectional.



Pure A·C

Q. NO.	ANSWER	MARKS

Characteristics of Pulsating dc :- (AC + dc) :→

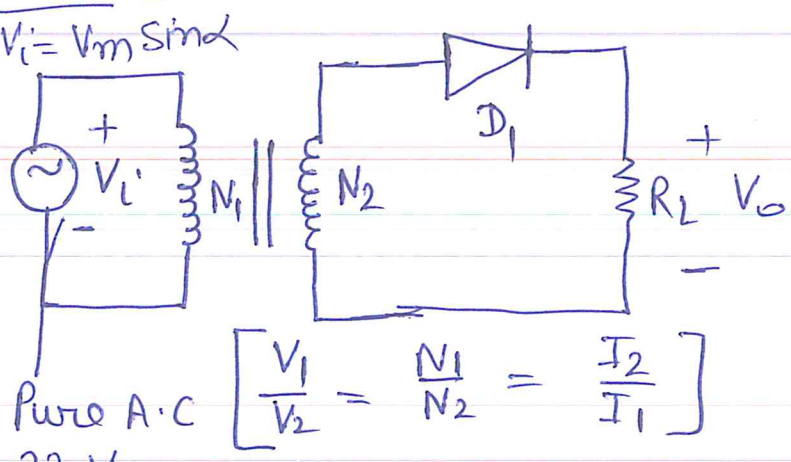
i) Periodicity (Shows A.C Behaviour).

ii) Non Zero average Value (Shows DC Behaviour)

iii) Unidirectional.

iv) Harmonics is Present.

Half wave Rectifier :-

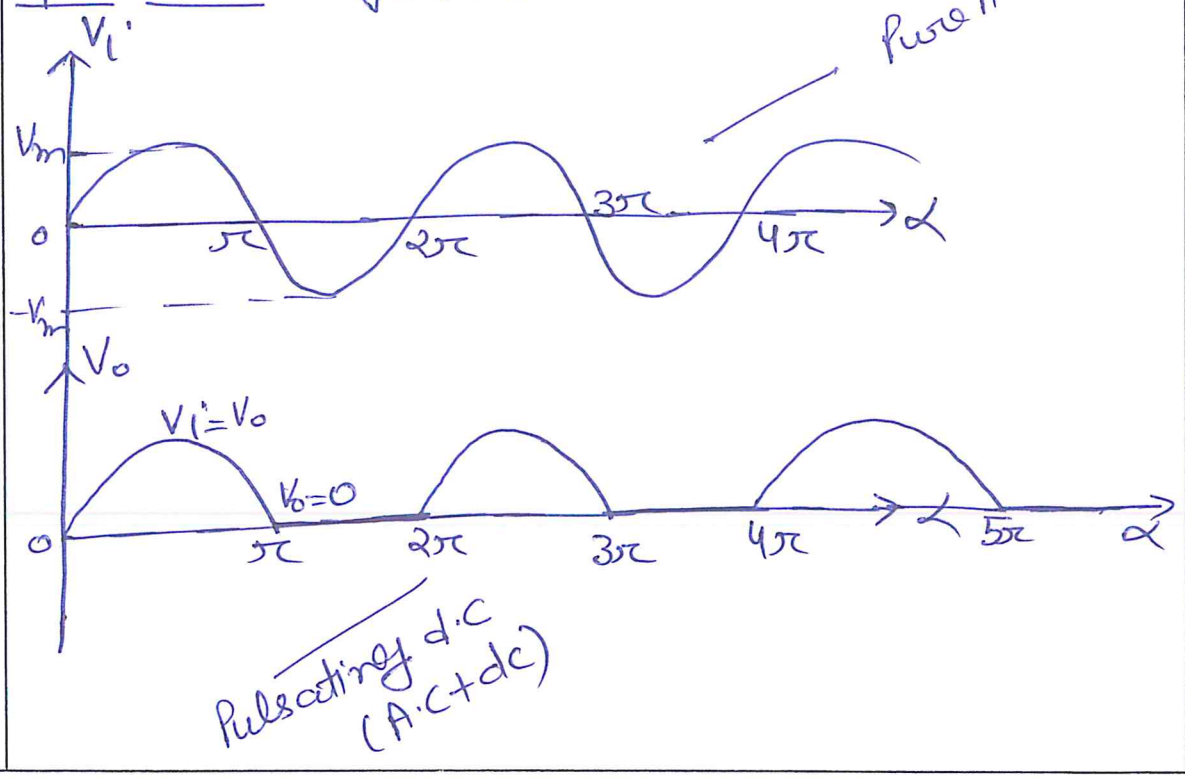


Pure A.C

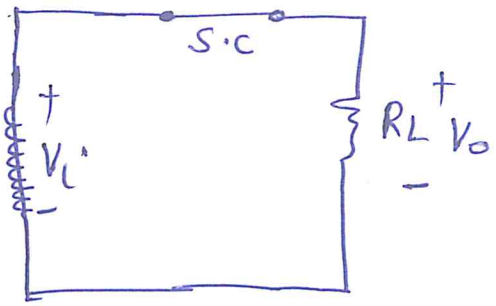
$\left[\frac{V_1}{V_2} = \frac{N_1}{N_2} = \frac{I_2}{I_1}\right]$

220V,
50 Hz

Operation :- $0 < \alpha < \pi$



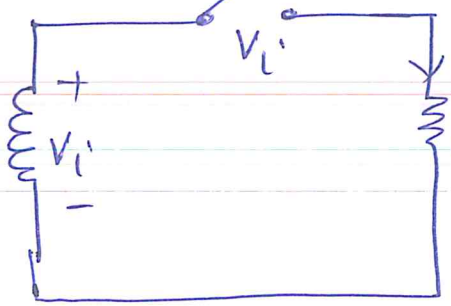
Q. NO.	ANSWER	MARKS



If $N_1 = N_2$

$V_o = V_i$

If $\pi < \alpha < 2\pi$ → OC circuit.



$= V_o = 0 \times R_L$

$= 0$

→ o/p of halwave Rectifier is unidirectional and Period is 2π (shows A.C behaviour).

$$\rightarrow V_{avg} = \frac{1}{2\pi}\left[\int_0^{\pi} V_m \sin\alpha \, d\alpha + \int_{\pi}^{2\pi} 0 \, d\alpha\right]$$

$$V_{avg} = \frac{V_m}{2\pi}\left[-\cos\alpha\right]_0^{\pi}$$

$$\left\{V_{avg} = \frac{V_m}{\pi}\right\} \longrightarrow \text{Shows DC (Behaviour).}$$

→ Ripple factor is $\gamma = \sqrt{\left(\frac{I_{rms}}{I_{dc}}\right)^2 - 1}$

is used to measure unwanted A.C component in the output of Rectifier.

Q. NO.	ANSWER	MARKS

$$I_{rms} = \sqrt{\frac{1}{T}\int_0^T i^2 dt} \quad T - \text{Period.}$$

$$I_{rms} \Rightarrow \sqrt{\frac{1}{2\pi}\int_0^{\pi} V_m^2 \sin^2\alpha \, d\alpha}$$

$$\left\{ V_{rms} = \frac{V_m}{2} \right\}$$

$\gamma \Rightarrow$ @ 1.21 (in Halfwave Rectifier) Means (A.C component is more stronger then D.C component), which is the the disadvantage.

$$\left\{ \gamma = \frac{V'_{rms}}{V_{dc}} = \frac{I'_{rms}}{I_{dc}} = \sqrt{\left(\frac{I_{rms}}{I_{dc}}\right)^2 - 1} \right\}$$

(END)

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BASIC ELECTRICAL AND ELECTRONICS
MIDTERM-I SOLUTION.

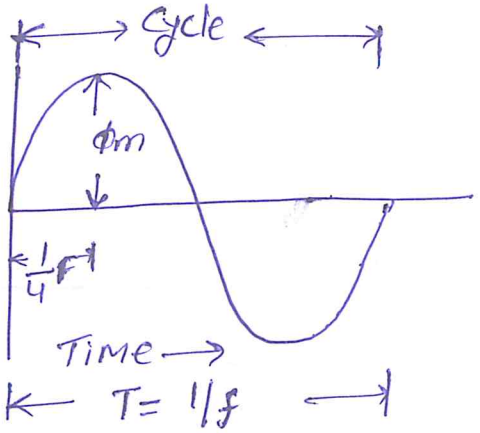
Q. NO.	ANSWER	MARKS

Q5 E.M.F Equation of Transformer

Let N_1 = No. of Turns in Primary
N_2 = Primary & Secondary

ϕ_m = maximum flux in core in webers.
= $B_m \times A$

f = frequency of a.c. input in Hz.



Average Rate of change of flux Per Turns means induced e.m.f in volts $\phi_m / 1/4f \Rightarrow 4f\phi_m$ volt

R.M.S value of Induced e.m.f
= Average value x Form Factor.
= $\frac{\text{r.m.s value}}{\text{average value}}$ = 1.11

Now r.m.s value of induced e.m.f/turn = $1.11 \times 4 \times f \phi_m$ volts.

Now This value for whole primary coil
= [No. of Primary Turns x Induced e.m.f/turn]

$E_1 = 4.44 f N_1 \phi_m = 4.44 f N_1 B_m A$. —(I)

Similarly
$E_2 = 4.44 f N_2 \phi_m = 4.44 f N_2 B_m A$. —(II)

A.P. KULDEEP SOA(N)

BASIC ELECTRICAL AND ELECTRONICS

MID TERM-I SOLUTION:-

Q. NO.	ANSWER	MARKS

Q.6. Explain Phasor Diagram of inductive load to a transformer.

Sol. When Transformer ON load Means Secondary winding is loaded, Secondary current I_2 is setup The magnitude and phase of Secondary current I_2 with Respect to V_2 is determined by characteristics of load. current I_2 is in lag if load is inductive.

Secondary current set up its own m.m.f $N_2 I_2$ its own flux ϕ_2 which is opposition to main primary flux ϕ which is due to I_0

$N_2 I_2$ = Demagnetising amp-turns.

ϕ_2 weakens ϕ Hence Primary back e.m.f E_1 tends to be Reduced.

Let additional Primary current be I_2' (load component of Primary current).

I_2' is In Antiphas with I_2

$N_1 I_2'$ = Produced ϕ_2' which opposition to ϕ_2 but same direction in ϕ and equal to it in magnitude. Hence two cancel each other out.

I_2 Neutralised I_2'

The Net flux passing through core is approximately same as at No load.

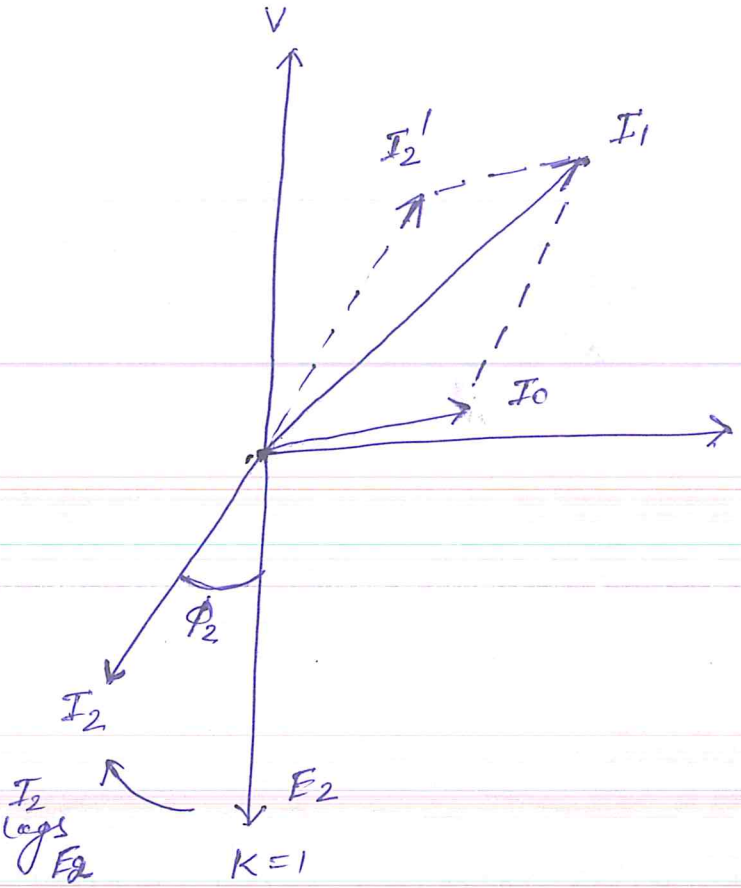
Core loss is also same under all load cond.

A.P. KULDEEP SOA (N)

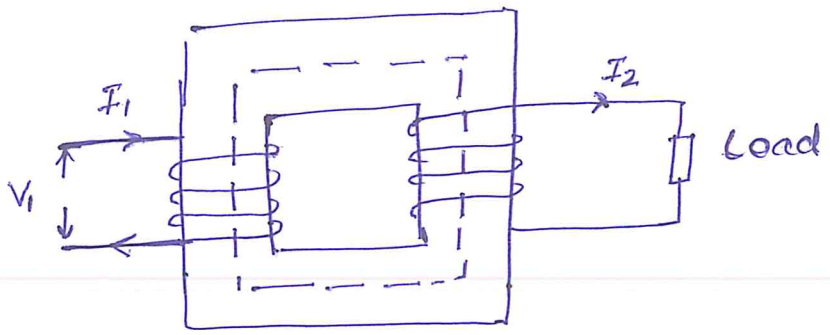
BASIC ELECTRICAL AND ELECTRONICS
MID TERM-I SOLUTION.

Q. NO.	ANSWER	MARKS

$\phi_2 = \phi_2'$ $\quad N_2 I_2 = N_1 I_2' \quad I_2' = \frac{N_2}{N_1} \times I_2 = K I_2$



Total Primary current I_1 is vector sum of I_0 & I_2' and lags behind V_1 by an angle ϕ_1



* Transformer on Load *

A.P. KULDEEP SOA (N)

BASIC ELECTRICAL AND ELECTRONICS

MIDTERM-I SOLUTION

Q. NO.	ANSWER	MARKS
Q7	Explain the Equivalent circuit diagram of Transformer.	
Sol.	Transformer diagrammatically can be Resolved into an equivalent circuit in which the Resistance, Reactance of Transformer, whose function is to transform the voltage.	

No load current I_o Simulated X_o pure Reactance Taking magnetising current I_μ

And also

Resistance R_o taking working component I_w connected in Parallel across primary winding

Then $E_1 = V_1 - I_1 Z_1$ $\quad X_o = E_1 / I_\mu$ $\quad I_\mu$*

$R_o = E_1 / I_w$

$E_2 / E_1 = N_2 / N_1 = K$. Transformation Ratio.

To make the Transformer calculation simpler

To transfer R, I, Z (Resistance, current, impedence) either to Primary or to secondary.

Primary Equivalent (values Refered from Secondary to Primary side of Transformer wdg.*

$E_2' = E_2 / K = E_1$

$V_2' = V_2 / K$

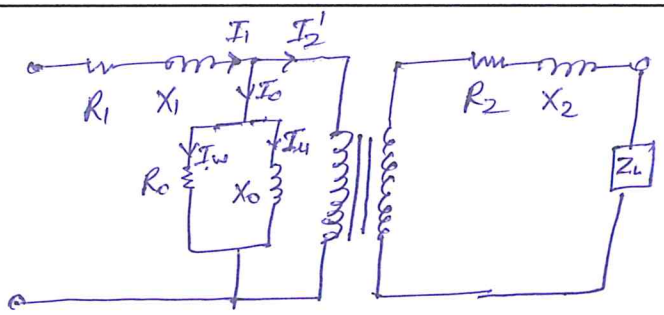
$I_2' = K I_2$

* winding.

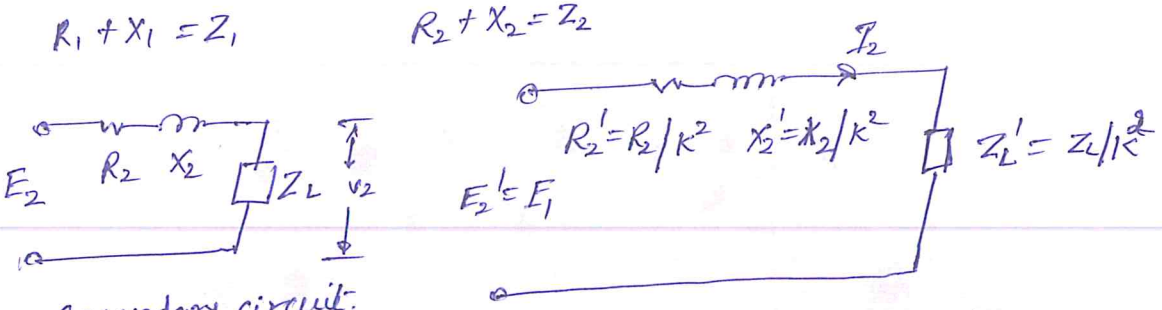
AP. KULDEEP (SOA) N.

BASIC ELECTRICAL AND ELECTRONICS
SOLUTION MIDTERM-I.

Q. NO.	ANSWER	MARKS

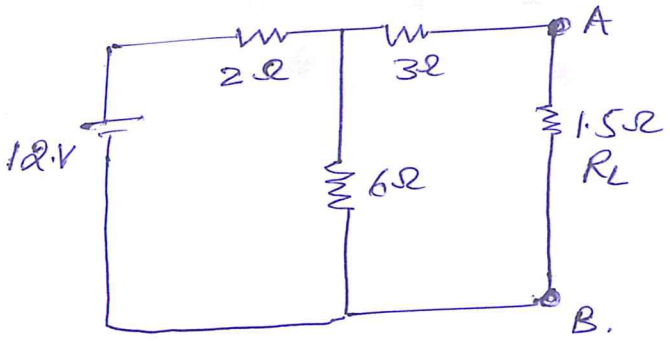


$R_1 + X_1 = Z_1$ $\quad$ $R_2 + X_2 = Z_2$



Secondary circuit → its equivalent primary values.

Q.8. Using Norton theorem Find out Norton current through load Resistance $R_L = 1.5\,\Omega$.



Sol. Any two Terminal active Network containing voltage sources and Resistance when viewed from its output terminal is equivalent to a constant current source and Parallel Resistance

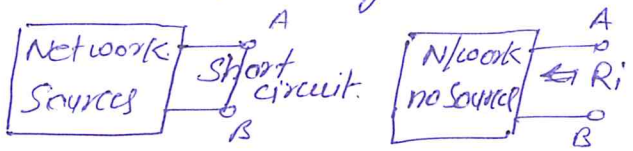
constant current → current flow in a circuit short placed across terminal.

BASIC ELECTRICAL AND ELECTRONICS SOLUTION MID TERM-1

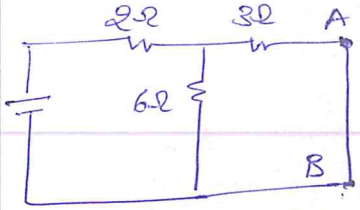
A.R KULDEEP (SOAN)

Q. NO.	ANSWER	MARKS

Parallel Resistance of Network when viewed from these open circuited terminals after voltage & current sources have been Removed & Replaced by their internal Resistance.



Step 1 :→ short 1.5Ω load Resistance.



Step 2 :→ Calculate Isc this is Norton current.

Total Resistance $R_T = 2 + (6//3) = 4\Omega$

$I_T = \frac{12V}{4\Omega} = 3A.$

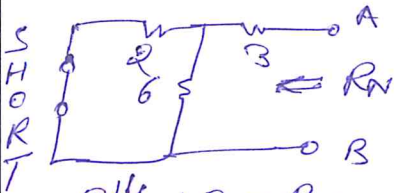
Now Isc Apply current divider Rule.

$I_{sc} = I_N = 3A \times \left[\frac{6}{(3+6)}\right] = 2A.$

$I_{sc} = I_N = 2A.$

Step 3 :- Open current Source, Short volt Source, open load Resistance.

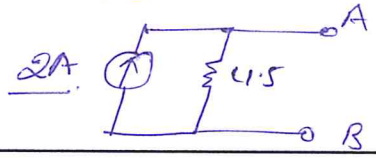
Step 4. Calculate R_N Norton Resistance.



$2//6 + 3 = R_N$

$= 4.5\Omega$

Step 5 :→ Connect R_N in Parallel with current Source I_N & Reconnect load Resistance R_L 1.5



Note

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Dated 12/03/18. **Signature of Paper Setter** **Signature of Principal/HOD**

School of Aeronautics(Neemrana)

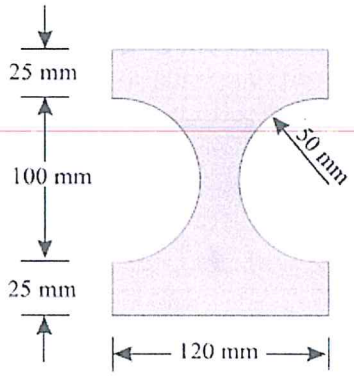
I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan

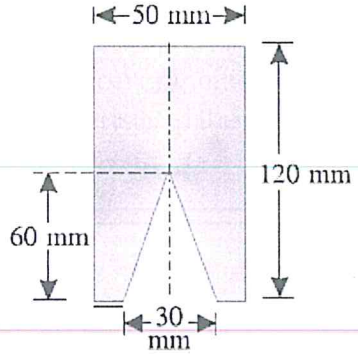
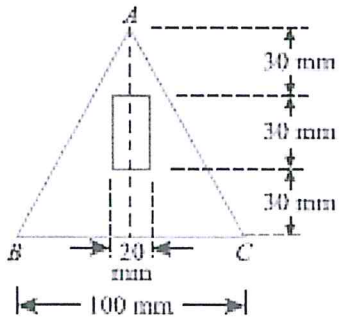
Fortnightly/Term : Mid Term -1 Date : 27. 02. 2018

Subject : **Engg. Mechanics (Th)** Batch : AE-12,13,14 & MT-3

Faculty Name : Mr. Sidharth Sondh Semester: II

(Answer any FIVE Questions. All Questions carry equal marks) **Total Marks: 45**

Q.No.	Questions	Unit Name / Topic
1.	Explain the following terms: I. Centroid II. Axis of reference III. Centre of mass (9)	Unit No.: Topic Name: Source:
2.	For a given cross-section of a cast iron beam. Determine the moments of inertia of the section about horizontal and vertical axes passing through its centroid of the section.  (9)	Unit No.: Topic Name: Source:
3.	With the help of a neat diagram, state and prove theorem of parallel axis. Also explain the application of this theorem in engineering field. (9)	Unit No.: Topic Name: Source:
4.	Distinguish between the following: I. Center of mass and center of gravity II. Moment of force and moment of inertia (9)	Unit No. Topic Name: Source:

Q.No.	Questions	Unit Name / Topic
5.	A rightcircular cone of 30 mm diameter and 60 mm height is cut from a cylinder of 50 mm diameter at 120 mm height as shown in the figure. Find the position of the center of gravity of the body.  (9)	Unit No.: Topic Name: Source:
6.	ABCD is rectangle, in which AB = CD = a, and BC = DA = b. Forces equal to P act along AD and CB and forces equal to Q act along AB and CD respectively. Prove that the perpendicular distance between the resultants of P and Q at A and that of P and Q at C = $\frac{(P-a)-(Q-b)}{\sqrt{P^2+Q^2}}$ (9)	Unit No.: Topic Name: Source:
7.	A right circular cylinder of 12 cm diameter is joined with a hemisphere of the same diameter face to face. Find the greatest height of the cylinder, so that the center of gravity of the composite section coincides with the plane of joining the two sections. The density of the material of hemisphere is twice that the material of cylinder. (9)	Unit No.: Topic Name: Source:
8.	A rectangular hole is made in a triangular section as shown in the figure. Determine the moment of inertia of this section about X-X axes passing through the center of gravity and base BC.  (9)	Unit No. Topic Name: Source:

School of Aeronautics (Neemrana)

I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan

MODEL ANSWER PAPER

Name of Examination: MID TERM - I Date of Examination: _____

Subject ENGG. MECHANICS Batch 12, 13, 14, MT-3 Semester II nd

Q. NO.	ANSWER	MARKS
1 (i)	Centroid: is the point that may be considered as the centre of a one-or-two-dimensional figure. It is also referred to as centre of gravity of a two-dimensional body or figure (like triangle, quadrilateral, circle, etc.)	
(ii)	Axis of reference: The centre of gravity of a body is always calculated with reference to some assumed axis known as axis of reference. All the calculations and perpendicular distances are takes from this axis.	
(iii)	Centre of mass: It is the point located on a body, where all the mass of a body is supposed to be concentrated or is acting.	

Q. NO.	ANSWER	MARKS

Q2 Since the section is symmetrical about the X-X & Y-Y axes, therefore the C.g. of the section will lie at the centre of rectangle. The two semicircles when placed together will form a circular hole with 50 mm radius and 100 mm diameter

for the rectangular section, moment of inertia about its horizontal axis passing through its cg.

$$= \frac{bd^3}{12} = \frac{120 \times 150^3}{12} = 33.75 \times 10^6 \text{ mm}^4$$

moment of inertia of circular section about a horizontal axis passing through cg.

$$= \frac{\pi}{4} \times r^4 = \frac{\pi}{4} \times 50^4 = 4.91 \times 10^6 \text{ mm}^4$$

moment of inertia of whole section = $I_{rectangle} - I_{circle}$.

$$= 33.75 \times 10^6 - 4.91 \times 10^6$$

$$= 28.84 \times 10^6 \text{ mm}^4.$$

Similarly for the vertical axis for the rectangular section

$$I_G = \frac{db^3}{12} = \frac{150 \times 120^3}{12} = 21.6 \times 10^6 \text{ mm}^4$$

Q. NO.	ANSWER	MARKS

area of semi-circular section

$$a = \frac{\pi r^2}{2} = \frac{\pi \times 50^2}{2} = 3927 \text{ mm}^2.$$

moment of inertia of semicircular section

$$I_{G_2} = 0.11 r^4 = 0.11 \times (50)^4 = 687.5 \times 10^3 \text{ mm}^4.$$

$$x_2 = \frac{4r}{3\pi} = \frac{4 \times 50}{3\pi} = 21.2 \text{ mm}$$

$$h_2 = 60 - 21.2 = 38.8 \text{ mm}$$

$$I_{yy_2} = I_{G_2} + a_2 h_2^2.$$

$$= (687.5 \times 10^3) + [3927 \times (38.8)^2]$$

$$= 6.6 \times 10^6 \text{ mm}^4.$$

For 2 semicircle moment of inertia would be

$$2 \times 6.6 \times 10^6 = 13.2 \times 10^6 \text{ mm}^4$$

MI of whole section

$$= 21.6 \times 10^6 - 13.2 \times 10^6$$

$$= 8.4 \times 10^6 \text{ mm}^4$$

Q. NO.	ANSWER	MARKS

Q3 Theorem of parallel axis states that if the moment of inertia of a plane area about an axes through its centre of gravity is denoted by I_G then moment of inertia of the area about any other axes AB parallel to the first and at a distance h from the centre of gravity is given by:

$$I_{AB} = I_G + ah^2$$

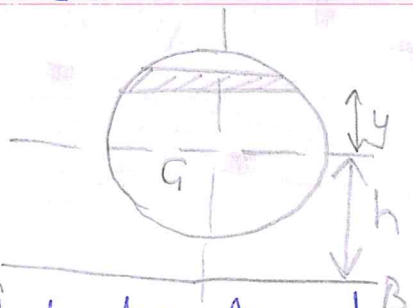
I_{AB} = moment of inertia about an axis AB

I_G = moment of inertia about it Cg

a = area of section

h = distance b/w Cg of ~~axis~~ section and axis AB.

Proof:



Consider a strip of a circle whose moment of inertia is required to be found out about a line AB.

let δa = Area of the strip.

y = Distance of the strip from the Cg of the section.

h = distance b/w cg of the section and the axis AB.

We know that moment of inertia of the whole section about an axis passing through the Cg of the section

Q. NO.	ANSWER	MARKS

$= \delta a y^2$.

∴ Moment of inertia of the whole section $= I_G = \Sigma \delta a y^2$.

Moment of inertia about AB axis

$I_{AB} = \Sigma \delta a (h+y)^2 = \Sigma \delta a (h^2 + y^2 + 2hy)$

$= \Sigma (h^2 . \delta a) + (\Sigma y^2 . \delta a) + (\Sigma 2hy \delta a)$

$= ah^2 + I_G + 0$.

$\Sigma \delta a y$ is algebraic sum of moments of all the areas, about an axis through CG. of the section & is equal to $a\bar{y}$, where $\bar{y}$ is the distance between the section and the axis passing through the CG, which is zero.

The application of this theorem is for irregular bodies & the bodies where the loads are changing. With the help of this theorem moment of inertia about any point could be calculated by considering a parallel axis.

School of Aeronautics (Neemrana)

I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan

MODEL ANSWER PAPER

Name of Examination: MIDTERM-I Date of Examination: _____

Subject ENNGG. MECHANICS Batch 12,13,14,MT3 Semester IInd

Q. NO.	ANSWER	MARKS
Q4 (i)	• Center of mass is the mean position of the mass in an object, whereas the center of gravity is the point where the gravity appears to act. • Centre of mass does not change with the change in gravitational force whereas center of gravity changes with gravitational forke. • Center of mass is a fixed point where as center of gravity is a dynamic point of the body.	
(ii)	• Moment of force is known as turning effect of force whereas moment of inertia is the resistance offered by a body for the change in rotation of the body. • Moment of force is the first moment of force whereas the moment of inertia is the second moment of force. • Unit of moment of force is	

Q. NO.	ANSWER	MARKS

is N-m whereas S.I unit of moment of inertia is N-m².

Q5 Since the figure is symmetric about y-axis, therefore $\bar{x} = \frac{50}{2} = 25$ mm.

Now finding $\bar{y}$.

for ~~section~~ cylinder

$$y_1 = \frac{120}{2} = 60 \text{ mm from base}$$

for cone

$$y_2 = \frac{h}{4} = \frac{60}{4} = 15 \text{ mm from base}$$

Volume of cylinder $= \pi r^2 h$.

V_1 $= \pi \times 25^2 \times 120$

$= 235619.45 \text{ mm}^3$.

Volume of cone $= \frac{\pi}{3} r^2 h$.

$$V_2 = \frac{\pi}{3} \times 15^2 \times 60$$

$$= 14137.166 \text{ mm}^3$$

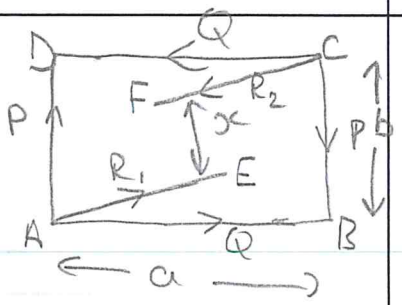
$$\bar{y} = \frac{V_1 y_1 - V_2 y_2}{V_1 - V_2}$$

$$= \frac{235619.45 \times 60 - 14137.166 \times 15}{235619.45 - 14137.166}$$

$$= 62.87 \text{ mm from base.}$$

Q. NO.	ANSWER	MARKS

Q6 Let the perpendicular distance between the resultants $= x$.



We know that

$R_1 = \sqrt{P^2+Q^2}$ —①

& $R_2 = \sqrt{P^2+Q^2}$ —②

from ① & ②

$R_1 = R_2 = R$.

We know moment of force P about A

$M_1 = P \times a$.

moment of force Q about A

$M_2 = -Q \times b$.

Net moment of two couples

$= (P \times a) - (Q \times b)$.

Resultant R_1 & R_2 also form a couple. ∴ the moment of the couple formed by resultant

$= R \times x = \left(\sqrt{P^2+Q^2}\right) \times x$

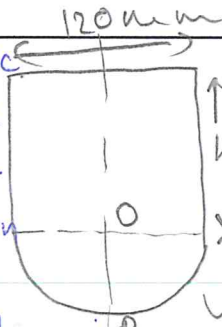
equating moments,

$\sqrt{P^2+Q^2} \times x = (P \times a) - (Q \times b)$

$$x = \frac{(P \times a) - (Q \times b)}{\sqrt{P^2+Q^2}}$$

Q. NO.	ANSWER	MARKS

Q7 As the ~~incorrect~~ body is symmetric about vertical axes, therefore its cg will lie on its axis. for the vertical axes cg location is at 60 mm from base P.



let, h = height of the cylinder in mm.

(i) Right circular cylinder

weight $w_1 = \rho_1 \times \frac{\pi}{4} d^2 \times h.$

$= \rho_1 \times \frac{\pi}{4} (120)^2 \times h = 3600\pi\rho_1 h$

& $y = 60 + \frac{h}{2} = 60 + 0.5h$ mm.

(ii) hemisphere.

$w_2 = \rho_2 \times \frac{2\pi}{3} \times r^3 = 2\rho_1 \times \frac{2\pi}{3} \times (60)^3$ $(\because \rho_2 = 2\rho_1)$

$= 288000\pi\rho_1.$

$y_2 = \frac{5r}{8} = \frac{5\times 60}{8} = \frac{300}{8} = 37.5$ mm.

We know $\bar{y} = \frac{w_1 y_1 + w_2 y_2}{w_1 + w_2}$.

$$60 = \frac{3600\pi\rho_1 h(60 + 0.5h) + (288000\pi\rho_1 \times 37.5)}{3600\pi\rho_1 h + 288000\pi\rho_1}$$

$$= \frac{216000h + 1800h^2 + 10800000}{3600h + 288000}$$

$1800h^2 = 17280000 - 10800000 = 6480000$

$h = \sqrt{\frac{6480000}{1800}} = \sqrt{3600} = 60$ mm.

School of Aeronautics (Neemrana)

I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan

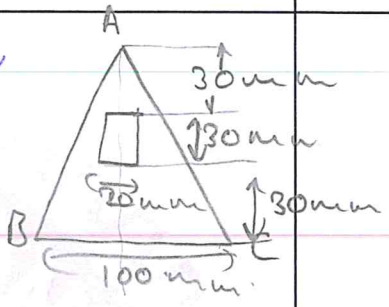
MODEL ANSWER PAPER

Name of Examination: MIDTERM-1 Date of Examination: _____

Subject ENGG. MECHANICS Batch 12,13,14,MT3 Semester IInd.

Q. NO.	ANSWER	MARKS

Q8 From the figure it is seen, the section is symmetric about Y axis, therefore the cg will lie of this axes.



(i) Triangular section

$$a_1 = \frac{100 \times 90}{2} = 4500\ mm^2.$$

$$y_1 = \frac{90}{3} = 30\ mm.$$

(ii) Rectangular hole

$$a_2 = 30 \times 20 = 600\ mm^2.$$

$$y_2 = 30 + \frac{30}{2} = 45\ mm.$$

$$\bar{y} = \frac{a_1 y_1 - a_2 y_2}{a_1 - a_2}.$$

$$= \frac{(4500 \times 30) - (600 \times 45)}{4500 - 600} = 27.7\ mm$$

Moment of inertia for X-X. -axes

for triangular section about its cg.

$$I_{G_1} = \frac{bd^3}{36} = \frac{(100 \times 90^3)}{36} = 2025 \times 10^3\ mm^4$$

Q. NO.	ANSWER	MARKS

& distance between cg of section and x-x axis

$h_1 = 30 - 27.7 = 2.3\ mm.$

$(\bar{I}_{xx})_{triangle} = I_{G_1} + a_1 h_1^2$

$= 2025 \times 10^3 + (4500 \times (2.3)^2)$

$= 2048.8 \times 10^3\ mm^4.$

Similarly for rectangular hole.

$I_{G_2} = \frac{bd^3}{12} = \frac{20 \times (30)^3}{12} = 45 \times 10^3$

$h_2 = 45 - 27.7 = 17.3\ mm.$

$(\bar{I}_{xx})_{rectangle} = (45 \times 10^3) + (600 \times (17.3)^2)$

$= 224.6 \times 10^3\ mm^4$

$I_{xx} = (\bar{I}_{xx})_{triangle} - (\bar{I}_{xx})_{rectangle}$

$= 2048.8 \times 10^3 - 224.6 \times 10^3$

$= 1824.2 \times 10^3\ mm^4.$

Q. NO.	ANSWER	MARKS

Moment of inertia about base BC

$I_{G_1} = \frac{bd^3}{12} = 6075 \times 10^3 \text{ mm}^4$.

$I_{G_2} = \frac{bd^3}{12} = \frac{100 \times 90^3}{12} \quad \frac{20 \times 30^3}{12}$

$= 45 \times 10^3 \text{ mm}^4$.

$h_2 = 30 + \frac{30}{2} = 45 \text{ mm}$.

$(I_{BC})_{\text{rectangle}} (45 \times 10^3) + [600 \times (45)^2]$

$= 1260 \times 10^3 \text{ mm}^4$.

$I_{BC} \{6075 \times 10^3) - (1260 \times 10^3)$

$= 4815 \times 10^3 \text{ mm}^4$.

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I-04, RIICO Industrial Area, Neemrana, Dist. Alwar, Rajasthan

Q. NO.	ANSWER	MARKS

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Dated 22/02/18. Siddartha Signature of Paper Setter Signature of Principal/HOD