



**MATHS (PART – I)**  
**{ Chap : 3 + 4 }**

**Time: 1<sup>1/2</sup> Hours**

**Max. Marks: 30**

**Note:** 1. All questions are compulsory. 2. Use of calculator is not allowed.  
 3. Figures to the right of questions indicate full marks.

**1.(A) Choose the correct alternative: ( Any Three )**

**[3]**

I. The sequence -2 , 1 , 4 , 6 , 9 , ..... is

- a) not an A.P.                      b) is an A.P. with  $d=2$   
 c) is an A.P. with  $d= - 2$       d) is an A.P. with  $d = 3$

II. For an A.P. if  $t_n = 18$  ,  $n = 12$  ,  $d = 1$  , then  $a = ?$

- a) 3              b) -7              c) -5              d) 7

III. If  $t_1 = 3$  ,  $t_n = 57$  and  $S_n = 900$  . What is the value of 'n' ?

- a) 10              b) 45              c) 40              d) 30

IV. SAC in GST stands for -----

- a) State Audit Code              b) Service Accounting Code  
 c) Service Audit Cell              d) State Account Code

V. All goods in GST are classified by giving numerical code, the code is -----

- a) GSTIN code              b) SGST code              c) SAC              d) HSN code

**(B) Solve the following questions ( Any Three ) :**

**[3]**

I. The first term 'a' and common difference 'd' are given.

Find first three terms of A.P. :  $a = -2$  ,  $d = 5$

II. Find whether 209 is in the sequence 3,7,11,15,-----?

III. Find whether given sequence is A.P. or not and find next two terms

$5/3$  ,  $2/3$  ,  $- 1/3$  ,  $- 4/3$  , ----- ,-----,

IV. Retailer paid GST of Rs.4700/- at the time of purchase and collected GST of Rs.6000/- at the time of sale. Find his payable GST.

V. If 60 shares of FV Rs.10 were purchased at a premium of Rs.5 .Company declared 20% dividend on the shares .Then find total dividend received.

**2.(A) Complete the following activities (Any One):**

[2]

I .Find  $t_n$  for A.P. : 7,12,17,22 , .... , .... and then find 15<sup>th</sup> term of A.P.

**Activity :** A.P. : 7,12,17,22 , .... , ....

$$t_n = \boxed{\phantom{00}}, a = 7, d = \boxed{\phantom{00}}$$

Now we will find ' $t_n$ '

$$t_n = a + (n - 1) \times d$$

$$t_{15} = 7 + (n - 1) \times \boxed{\phantom{00}}$$

$$t_{15} = 7 + \boxed{\phantom{00}}$$

$$t_{15} = 7 + (5 \times 15 - 5)$$

$$t_{15} = \boxed{\phantom{00}}$$

II. Which term of the following A.P. is 144 . A.P. is 4 , 11 , 18 , 25 , --- ,-----.

**Activity :** Given AP 4, 11, 18, 25,-----,----- .

$$\text{Here } a = 4, d = 11 - \boxed{\phantom{00}} = 7$$

$n^{\text{th}}$  term of this AP is 144.

$$t_n = a + (n - 1) \times d$$

$$144 = 4 + (n - 1) \times \boxed{\phantom{00}}$$

$$144 = 4 + \boxed{\phantom{00}}$$

$$144 + 3 = \boxed{\phantom{00}}$$

$$\frac{147}{7} = n = \boxed{\phantom{00}} \quad \text{Hence, } t_{\boxed{\phantom{00}}} = 144$$

III. Sumeet purchased 70 shares of MV Rs.50. Brokerage paid at the rate of 0.7% and rate of GST on brokerage is 18%. Find the total GST he paid .

**Activity :** Value of 70 shares =  $70 \times \boxed{\phantom{000}} = \text{Rs. } 3500/-$

Total Brokerage =  $\text{Rs. } 3500/- \times 0.7\% = \boxed{\phantom{000}}$   
Now Total GST will be,

GST =  $18\% \times \boxed{\phantom{000}} \therefore \text{Total GST} = \boxed{\phantom{000}}$

**(B) Solve the following questions ( Any Three ) :**

**[6]**

I. Find the sum of all even numbers from 1 to 125

II. Find the 20<sup>th</sup> term of A.P. : 7 , 12 , 17 , 22 , ----- ?

III. If the first term of an A.P. is 5 and the common difference 2 .Then find  $S_{16}$

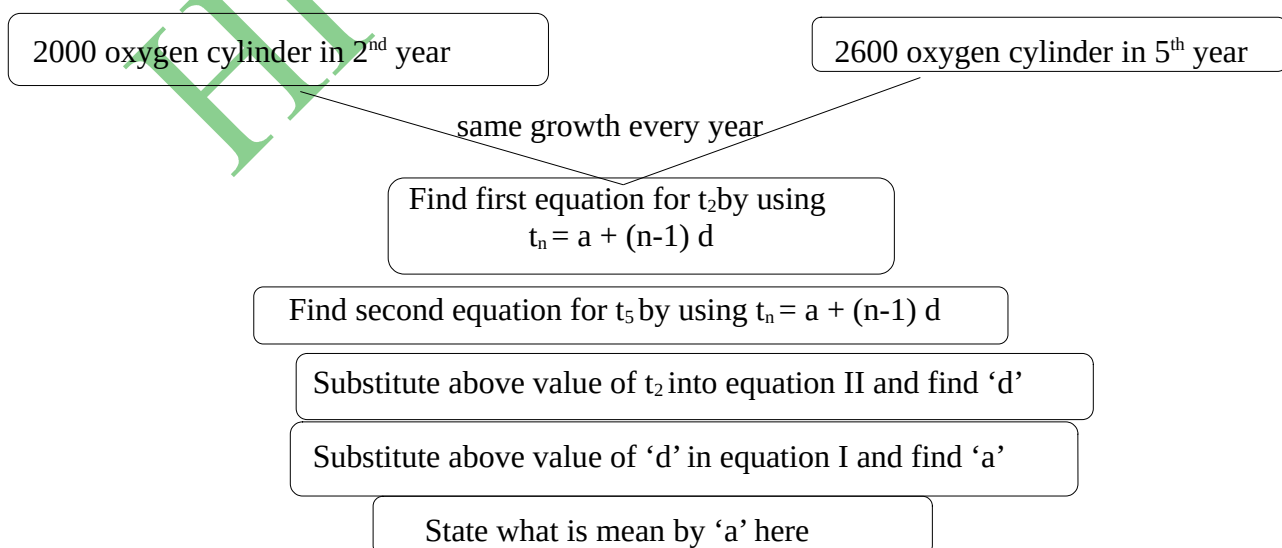
IV. Vaishali invested Rs. 2,41,416 in shares of FV Rs.10 .If MV is 150 . Rate of brokerage is 0.5 % and GST is 18% .Then find the amount of brokerage paid and GST paid.

V. The value of watch is Rs. 590. The rate of GST is 18%. Then what is the price of watch for customer ?

**3 (A). Complete the following activity 9 Any One ) :**

**[3]**

I. Follow given steps and complete the activity to find production of oxygen gas cylinder.



Now calculate production of oxygen cylinders in 9<sup>th</sup> year by using  
 $t_n = a + (n-1)d$

Find total production in first 7 years

II. Rakesh bought 70 shares of FV Rs.100 , having MV Rs. 200 . Company gave 35% dividend on the shares . Find the rate of return on investment ?

**Activity** : FV of shares = Rs.  , MV of shares = Rs.

The dividend is 35% ; Dividend Rs.35 on investment of Rs. 200/-

The rate of return on investment is  $= \frac{\text{Dividend}}{\text{Investment}} \times 100$

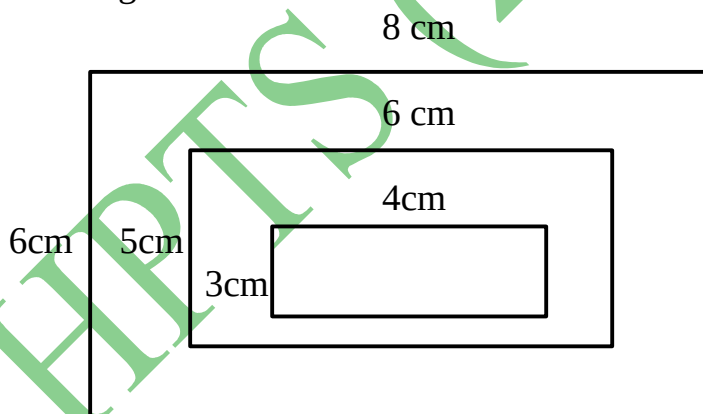
The rate of return on investment is  $= \frac{\text{Dividend}}{\text{Investment}} \times 100$

**(B) Solve the following questions ( Any Two ) :**

**[6]**

I. In an A.P. the 15<sup>th</sup> term is 44 .The sum of the 6<sup>th</sup> and 8<sup>th</sup> term is 40 . Find the A.P.

II. Observe the diagram and find the area of 25<sup>th</sup> consecutive rectangle.



III. How many two digit numbers are divisible by 5 ?

IV. Rameena invested 9930 in the shares of FV Rs.10 when the MV was Rs. 90 . She sold all the shares at MV of Rs.80 after taking 50% dividend .She paid 0.3 % brokerage at each stage of transactions. What was the total gain or loss in this transactions ?

V. Abdul invested in shares as follows .Find his total investment .

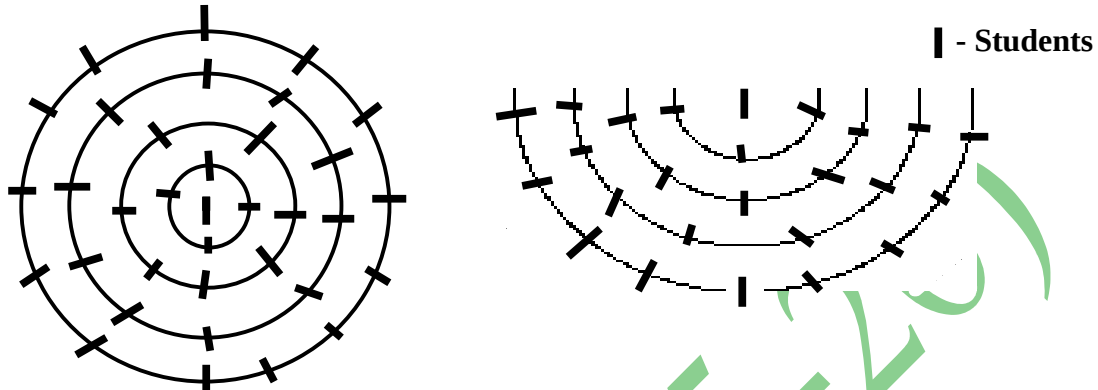
Company A : 300 shares , FV = Rs.10 , Premium = Rs. 10

Company B : 1540 shares ,FV = Rs.10 , Discount = Rs. 2

Company C : 160 shares , FV = Rs.100 , Premium = Rs.120 .

**4.Solve the following questions (Any One):****[4]**

I. Observe given arrangements . In first arrangement there are total 25 circles and in second arrangement there are total 32 semicircles . Students if standing as shown in diagram , find which arrangement will accommodate more students and by how much number ?



II. The 20<sup>th</sup> term and 29<sup>th</sup> term of an A.P. are 30 and 57 respectively . Then find 42<sup>th</sup> term.

III. Anil invested 12,500 when MV of the share was Rs.100 . He sold 40 shares when the MV was 120 and sold the remaining shares when the MV was Rs.70. He paid 0.1% brokerage for each trading. Find whether he made profit or loss and how much ?

**5. Solve the following questions:****[3]**

I. The sum of natural numbers from 1 to n is 78 . Find the value of n ?

II. Rohit invested 18,090 in the shares of FV Rs.10 when the MV Rs.90 .He sold all the shares at MV Rs.110/- after taking 30% dividend. He paid 0.5 % brokerage at each stage of transactions. What was the total gain or loss in this trading ?

**MARCH 24**



**MATHS (PART – II)**  
**{ Chap : 5 + 6 }**

**Time: 1<sup>1/2</sup> Hours**

**Max. Marks: 30**

**Note :** 1. All questions are compulsory. 2. Use of calculator is not allowed.  
 3. Figures to the right of questions indicate full marks.

**1.(A) Choose the correct alternative ( Any Three ) :**

**[3]**

I. The value of  $\sin^2 45^\circ + \cos^2 60^\circ$  is -----

- a) 1      b)  $\frac{3}{4}$       c)  $\frac{1}{\sqrt{2}}$       d)  $\frac{3}{\sqrt{2}}$

II.  $\sec \theta \times \cos \theta =$  -----

- a) 0      b) 1      c) 2      d)  $\frac{1}{\sqrt{2}}$

III. The point of concurrence divides the median in the ratio -----

- a) 3 : 2      b) 1 : 2      c) 2 : 1      d) 1 : 3

IV. If  $\cos ( 60^\circ - x ) = \sin 60^\circ$ . Value of 'x' is -----

- a)  $30^\circ$       b)  $90^\circ$       c)  $60^\circ$       d)  $45^\circ$

V. If the angle made by the line with the positive direction of X – axis is  $60^\circ$   
 Then slope is ----- a) 1      b) not defined      c)  $\sqrt{3}$       d) 2

**(B) Solve the following questions ( Any Three ) :**

**[3]**

I. If  $\sin \theta = \frac{9}{15}$ . Find the value of  $\cos \theta$  using trigonometric identity.

II. If  $\tan \theta = \frac{3}{4}$ , then find  $\sin \theta$ .

III. Prove that  $\cos^2 \theta ( 1 + \tan^2 \theta ) = 1$

IV. Find the slope of the line passing through points A ( 3 , 4 ), B ( 5 , 8 )

V. Find k , if line passing through A ( -11,- 2 ) and B ( 7, k )

**2.(A) Complete the following activities (Any One):**

**[2]**

I. Find the distance between following pairs of points.

A(3,4) ; B(5,2) by filling correct options.

**Activity :** Suppose co-ordinates of point A are  $(x_1, y_1)$  and of point B are  $(x_2, y_2)$

$$x_1 = 3, y_1 = 4$$

$$x_2 = \boxed{\phantom{00}}, y_2 = 2$$

By distance formula

$$AB = \sqrt{(x_2 - x_1)^2 + (\boxed{\phantom{00}} - \boxed{\phantom{00}})^2}$$

$$= \sqrt{(\boxed{\phantom{00}} - \boxed{\phantom{00}})^2 + (2 - 4)^2}$$

$$= \sqrt{\boxed{\phantom{00}}}$$

$$= \boxed{\phantom{00}}$$

II . Find x if distance between M ( x , 8 ) and N( 2 , 16 ) is 17 by completing following activity.

**Activity :** M ( x , 8 ) and N( 2 , 16 )

$$MN = 17$$

By distance formula

$$MN = \sqrt{(x - 2)^2 + (\boxed{\phantom{00}} - \boxed{\phantom{00}})^2}$$

$$17 = \sqrt{(x - 2)^2 + (-8)^2}$$

squaring both the sides , we get

$$289 = \boxed{\phantom{00}} + 64$$

$$(x - 2)^2 = \boxed{\phantom{00}}$$

Take square roots of both sides

$$x - 2 = \pm \boxed{\phantom{00}}$$

$$x = \boxed{\phantom{00}} \quad \text{or} \quad x = -13$$

III. If  $\sec \theta = 25/7$ , then  $\tan \theta = ?$

**Activity :**  $1 + \tan^2 \theta = \sec^2 \theta$

$$1 + \tan^2 \theta = (25/7)^2$$

$$\tan^2 \theta = \frac{\boxed{\phantom{00}}}{\boxed{\phantom{00}}} - 1$$

$$\tan^2 \theta = \frac{\boxed{\phantom{00}} - \boxed{\phantom{00}}}{49} = \boxed{\phantom{00}}$$

$$\tan \theta = \boxed{\phantom{00}}$$

**(B) Solve the following questions (Any Three) :**

[6]

I. Prove that,  $\cot^4 \theta + \cot^2 \theta = \operatorname{cosec}^4 \theta - \operatorname{cosec}^2 \theta$

II. If  $8 \sin \theta + 15 \cos \theta = 0$  Find the value of  $\sec \theta$ .

III. Find the coordinates of the points of trisection of the line segment AB with A(3,8) and B(-3,-7).

IV. From the top tower a jawan is watching military camp with an angle of depression  $45^\circ$ . If the height of the tower is 90cm. Find how far the camp is from tower?

**3 (A). Complete the following activity 9Any One) :**

[3]

I.  $\cos \theta = \frac{1}{\sqrt{2}}$ . then find the value of  $\frac{1 - \operatorname{cosec} \theta}{1 + \sec \theta}$  by filling appropriate options.

**Activity :**  $\cos \theta = \frac{1}{\sqrt{2}}$

$$\sec \theta = \boxed{\phantom{00}}$$

$$\sin^2 \theta + \cos^2 \theta = 1$$



$$\sin^2 \theta + ( \quad ) = 1$$

$$\sin^2 \theta = 1 - \quad = \frac{1}{2}$$

$$\sin \theta = \quad$$

$$\operatorname{cosec} \theta = \quad$$

$$\frac{1 - \operatorname{cosec} \theta}{1 + \sec \theta} = \frac{1 - ( \quad )}{1 + \sqrt{2}}$$

II. In  $\Delta PQR$ , O (-2,-5) is the centroid. If P (-12,-17) and Q (5,7) .Then find the 'x' coordinate of R by completing following activity .

**Activity :** P ( -12 , -17 ) , Q ( 5 , 7 ) , O ( -2 , -5 )

Suppose p has coordinates (x<sub>1</sub>,y<sub>1</sub>) ,Q has coordinates (x<sub>2</sub>,y<sub>2</sub>) and R has coordinates (x<sub>3</sub>,y<sub>3</sub>) and O has coordinates (x,y)

By centroid formula ,

$$x = \frac{x_1 + \quad + \quad}{3}$$

$$-2 = \frac{\quad + \quad + \quad}{3}$$

$$-6 = \quad + \quad$$

$$x_3 = 1$$

**(B) Solve the following questions (Any Two) :**

**[6]**

I. Prove :  $\frac{\cot^3 \theta - 1}{\cot \theta} = \frac{\sin^2 \theta + \tan \theta}{\sin^2 \theta \times \tan \theta}$

II. Verify that points A (-3,3) B (3,3) and C (3,8) are vertices of a right angled triangle

III. From the top of a building, an observer looking at a car makes angle of depression of  $70^\circ$ . If the height of the lighthouse is 70 m. Then find how far the car is from the building. (  $\tan 70^\circ = 2.75$  )

**4.Solve the following questions (Any One):****[4]**

I. Prove the following :

$$\sec \theta (1 + \sin \theta) (\cot \theta) = \frac{\sec \theta}{\tan \theta} + 1$$

II. Find the lengths of the medians of a triangle whose vertices are  
 A ( 2,2) ; B( 4,2) ; C ( 2, 4)

III. Fighter plane at a height of 580 m from earth , made an angle of depression of  $45^\circ$  and bombarded a special missile which destroyed target at say C . In another attempt it destroyed target at D from same height and same point but by decreasing an angle of depression by  $15^\circ$ . Find how far is the second target from first target. ( $\sqrt{3} = 1.73$  )

**5. Solve the following questions ( any one ) :****[3]**I. Find whether  $\sec^4 A (1 - \sin^4 A) - 2 \tan^2 A = 1$  or not ?

II. Find whether points P (1,-1) ,Q (4,2) , R ( 1,-2 ) , S ( -2,-5 ) are the vertices of a parallelogram or not



MARCH 24



**SCIENCE AND TECHNOLOGY PART – I**  
**{ Chap 9 : Carbon Compounds + Chap10 : Space Missions }**

**Time : 1<sup>1/2</sup> Hours**

**Total Marks : 30**

**Note :** 1.All questions are compulsory. 2.Draw scientifically, technically correct labeled diagrams wherever necessary. 3.Start writing each main question on new page. 4.Figures to the right indicate full marks. 5.For each MCQ (i.e. Q.No.1-A) evaluation would be done for first attempt only. 6.For each MCQ correct answer must be alphabet showing correct option.e.g. (I) (a) (II) (b) (III) (c)

**1 (A).Choose the *correct* alternative :**

**[5]**

I. Ethanol reacts with sodium metal to release ----- gas.

(A) N<sub>2</sub>      (B) O<sub>2</sub>      (C) Na<sub>2</sub>S      (D) H<sub>2</sub>

II. The indicator used in a oxidation of ethanol is -----

(A) iodine    (B) phenolphthaline    (C) potassium permanganate    (D) None of these

III. Geostationary satellite completes one revolution in -----.

(A) 1 year      (B) 90 min      (C) 2 to 24 hrs      (D) 24 hrs

IV. Mangalyan was launched in -----

(A) 2015    (B) 2013    (C) 2012    (D) 2011

V. ----- is a earth observation satellite

(A) INSAT    (B) GSAT    (C) IRS    (D) IRNSS

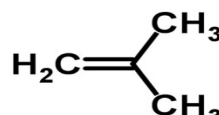
**(B) Answer the following questions :****[5]**

I. Complete the correlation - High Earth Orbit : 35780 km :: Low Earth Orbit : -----

II. Pick odd man out : Sputanik , INSAT , IRS , GSLV

III. Pick odd man out :  $\text{CH}_4$  ,  $\text{C}_2\text{H}_4$  ,  $\text{C}_3\text{H}_8$  ,  $\text{C}_5\text{H}_{12}$  ,  $\text{C}_4\text{H}_{10}$ 

IV. Identify the molecule :

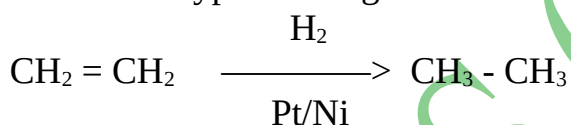
V. State whether the following statement is *True* or *False* :  
'Hexane is cyclic hydrocarbon'.**2 (A). Give any one Scientific Reason :****[2]**

I. Colour of iodine disappears in the reaction with oil but there is no colour change with vanaspati ghee

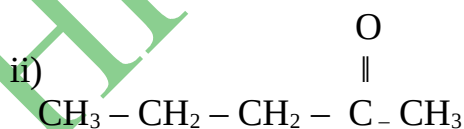
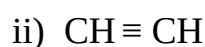
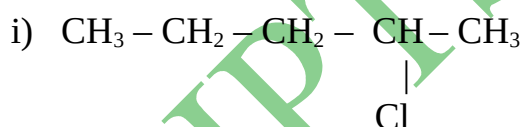
II. Launch vehicles of more than one stage are used to launch satellites.

**(B) Attempt any two of the following questions :****[4]**

I. Find the type of the given reaction and explain it.



II. Write IUPAC names of the following :

III. Find the tangential velocity of the satellite if the orbit of a satellite is 36720 km above the earth's surface. { $G = 6.67 \times 10^{-11} \text{ Nm}^2/\text{Kg}^2$ ,  $M = 6 \times 10^{24} \text{ Kg}$ ,  $R = 6400 \text{ km}$ }

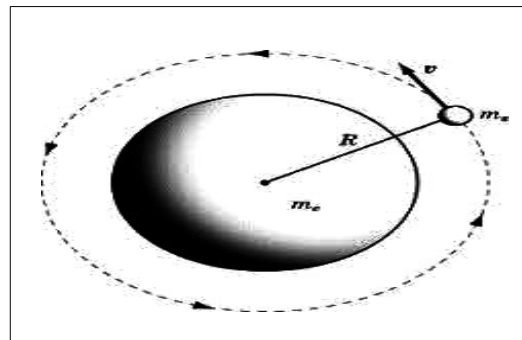
IV. Complete the table

Reactions	Combustion reaction	Substitution reaction
Definition		Place of one type of atom/group in a reactant is taken by another atom/group
Example		

V. Given diagram is showing orbit of an artificial satellite .

Answer the questions :

1. Which property of satellite decide height and nature of satellite's orbit ?
2. Critical velocity of the satellite is in which direction ?



3. Attempt *any three* of the following questions :

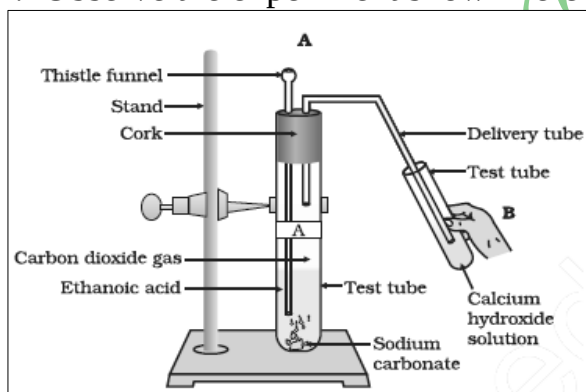
[9]

I. Identify the concept explained in this para and answer the questions :

$\text{CH}_3 - \text{OH}$  ,  $\text{CH}_3 - \text{CH}_2 - \text{OH}$ ,  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{OH}$ ,  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{OH}$   
These series of compounds are having same functional group but different length of carbon chain. Their chemical properties are very much similar. Gradation in physical properties observed in such group of compounds.

**Que :** a) Which prominent property of carbon compounds is discussed here ?  
b) Explain this property . c) Give one more example.

II. Observe the experiment shown here and answer the questions



**Que :** a) Which reactants are used here ?  
b) What change will take place in the colour of lime water ? Why ?  
c) Write well balanced reactions taking place in this experiment .

III. Draw line structures for the following carbon compounds

- a) Propene      b) Cyclohexene      c) Isobutane

IV. If the orbit of a satellite is 36720 km above the earth's surface and velocity of the satellite is 3.05 km/sec. How much time the satellite will take to complete one revolution around the earth ? (  $G = 6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$  ,  $R = 6400 \text{ km}$  )

V. What is space debris ? Why it is necessary to manage space debris ?

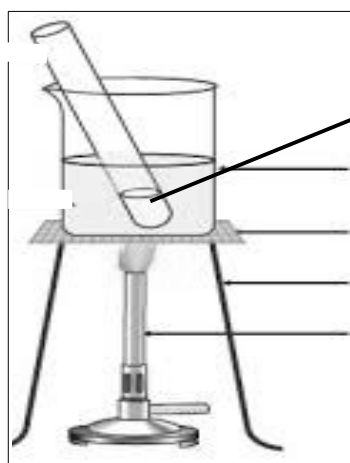
VI. Complete the chart and explain in short.

Polymer	Monomer	Structure	Use
Polyethylene	$\text{CH}_2 = \text{CH}_2$	-----	Carry bags ,wear
PVC	-----	-----	-----
Polyacrylo nitrile	-----	-----	Winter clothing

4. Answer any one of the following questions :

[5]

I. Observe the given reaction conditions and answer the questions :



Mixture of Ethanoic Acid, Ethanol and Conc. Sulphuric Acid  
Beaker  
Wire Gauze  
Stand  
Burner

- Que :** a) Which reactants are used here ?  
b) What will be the product of this reaction ?  
c) Which catalyst used here ?  
d) Write well balanced reaction for the same .  
e) What are the uses of the product formed ?

II. Explain structure and functioning of satellite launch vehicle with the help of neat labeled diagram.



MARCH.23



**SCIENCE AND TECHNOLOGY PART – II**  
**{ Chap 9 : Social Health + Chap 10 : Disaster Management }**

**Time : 1<sup>1/2</sup> Hours**

**Total Marks : 30**

**Note :** 1.All questions are compulsory. 2.Draw scientifically, technically correct labeled diagrams wherever necessary. 3.Start writing each main question on new page. 4.Figures to the right indicate full marks .5.For each MCQ ( i. e. Q. No.1-A) evaluation would be done for first attempt only.6.For each MCQ correct answer must be alphabet showing correct option. e. g. (I) (a) (II) (b) (III) (c)

**1 (A).Choose the *correct* alternative :**

**[5]**

I. Alcohol affects -----

(A) lungs      (B) digestive track   (C) heart      (D) nervous system

II. Adolescents are under the influence of -----

(A) parents   (B) teachers   (C ) peer group   (D) neighbourhood

III. Rehabilitation is a part of ----- phase.

(A) transitional   (B) terminal   (C) ultimate   (D) later

IV. Disasters always leads to damage -----

(A) life & property   (B) communication & health  
 (C) society & local government   (D) economy & ecology

V. Attack of virus is a ----- type of disaster.

(A) Geological      (B) Unknown   (C) Biological   (D) International

**(B) Answer the following questions :****[5]**

I. Find the odd man out :

Gardening, Bird Watching, Linger in nature, Indulging in selfie, Rearing animals

II. Find whether the given statement is right or wrong .

‘Ability to change one’s own behaviour according to changing social conditions is an important characteristics of social health.’

III. Identify the sign :



IV. Name the type of disaster – Erosion

V. Match the following :

Column I	Column II
1. tsunami	(a) Atmospheric
2. snow-storms	(b) Geological
	(c) Biological
	(d) Unknown

**2 (A). Give *any one* Scientific Reason :****[2]**

I. Importance of disaster management has become the foremost need of almost all the nations

II. Girls are facing the problem of stress .

**(B) Attempt *any two* of the following questions :****[4]**

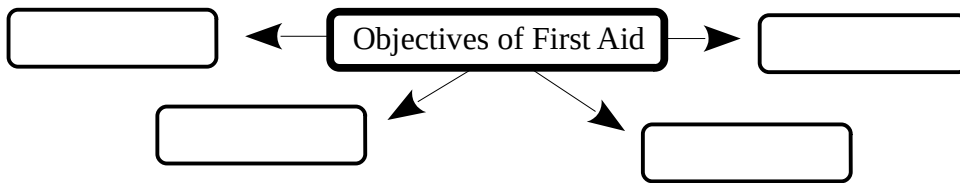
I. Observe the picture and answer the questions.

**Que :** a) What type calamity is shown in this picture?

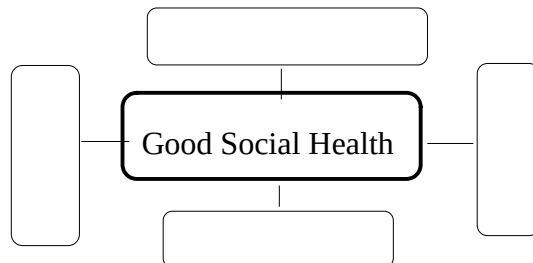
b) Suggest measures to manage such calamities.



II. Complete the flow chart :



III. Complete the concept map :



IV. Mock drill is arranged on disaster of fire in schools.  
What are the objectives of mock drills ?

3. Attempt *any three* of the following questions :

[9]

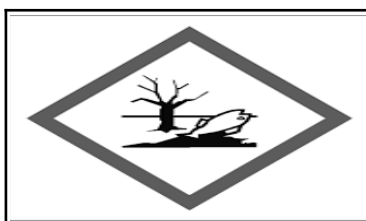
I. Complete the chart and explain in short :



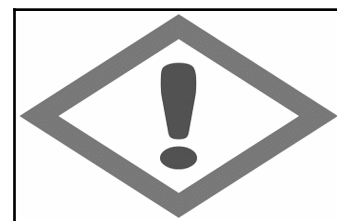
II. Write the meanings of following signs .



(a)



(b)



(c)

III. Observe the picture and answer the questions.



- Que :** a) What are these senior citizens doing ?  
 b) Why it is necessary to perform such activities ?  
 c) Suggest some more similar useful activities ?

IV. What will you do if your friend is spending more time on mobile games.

V. Observe picture and answer the questions ::



- Que :** a) Which mental illness is shown in above picture ?  
 b) Which social message will you give against this type of behavior ?

**4. Answer the following question :**

**[5]**

I. Explain the structure of Disaster Management Authority in detail with the help of concept map.



**MARCH 23**

## SCIENCE AND TECHNOLOGY PART – I

{ Chap 9 : Carbon Compounds + Chap10 : Space Missions }

**Time : 1<sup>1/2</sup> Hours****Total Marks : 30**

**Note :** 1.All questions are compulsory.2.Draw scientifically, technically correct labeled diagrams wherever necessary.3.Start writing each main question on new page.  
4.Figures to the right indicate full marks .5.For each MCQ (i.e. Q.No.1-A) evaluation would be done for first attempt only.6.For each MCQ correct answer must be alphabet showing correct option.e.g. (I) (a) (II) (b) (III) (c)

**1 (A).Choose the correct alternative :****[5]**

I. Ethanol reacts with sodium metal to release ----- gas.

(A) N<sub>2</sub> (B) O<sub>2</sub> (C) Na<sub>2</sub>S (D) H<sub>2</sub>

II. The indicator used in a oxidation of ethanol is -----

(A) iodine (B) phenolphthaline (C) **potassium permanganate** (D) None of these

III. Geostationary satellite completes one revolution in -----.

(A) 1 year (B) 90 min (C) 2 to 24 hrs (D) **24 hrs**

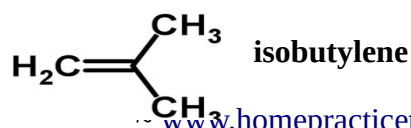
IV. Mangalyan was launched in -----

(A) 2015 (B) **2013** (C) 2012 (D) 2011

V. ----- is a earth observation satellite

(A) INSAT (B) GSAT (C) **IRS** (D) IRNSS**(B) Answer the following questions :****[5]**I.Complete the correlation : High Earth Orbit : 35780::Low Earth Orbit: **180 -2000 km**II. Pick odd man out : Sputanik,INSAT,IRS,**GSLV**III. Pick odd man out : CH<sub>4</sub> , **C<sub>2</sub>H<sub>4</sub>** , C<sub>3</sub>H<sub>8</sub> , C<sub>5</sub>H<sub>12</sub> , C<sub>4</sub>H<sub>10</sub>

IV. Identify the molecule :



V. State whether the following statement is *True* or *False* :

'Hexane is cyclic hydrocarbon'. **False**

2 (A). Give *any one* Scientific Reason :

[2]

I. Colour of iodine disappears in the reaction with oil but there is no colour change with vanaspati ghee .**Reason: Oil is having unsaturated chains while vanaspati ghee is having saturated chains . Unsaturated compounds having tendency to undergo addition reaction to form saturated compounds. The addition of iodine with unsaturated compounds take place instantaneously at room temperature and colour of iodine disappears. Hence colour of iodine disappears in the reaction with oil but as vanaspati ghee is saturated , it does not undergo addition with iodine and no colour change.**

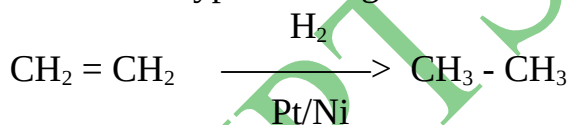
II. Launch vehicles of more than one stage are used to launch satellites.

**Reason :The structure of the launch vehicle is decided by the weight of the satellite and the type of satellite orbit.The fuel of the vehicle also depends on these factors.The fuel forms a major portion of the total weight of the launch vehicle.Thus vehicle has to carry a large weight of the fuel. To overcome this problem, launch vehicle of more than one stage are used. Due to this weight can be reduced step by step.**

(B) Attempt *any two* of the following questions :

[4]

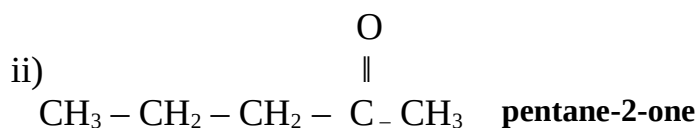
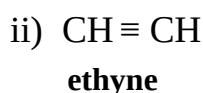
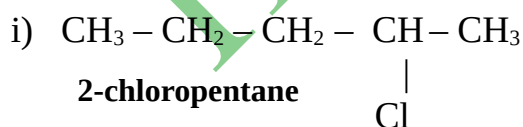
I. Find the type of the given reaction and explain it.



It is 'Addition Reaction'

Expl:As given on textbook page no.125.

II. Write IUPAC names of the following :



III. Find the tangential velocity of the satellite if the orbit of a satellite is 36720 km above the earth's surface.  $G = 6.67 \times 10^{-11} \text{ Nm}^2/\text{Kg}^2$ ,  $M = 6 \times 10^{24} \text{ Kg}$ ,  $R = 6400 \text{ km}$ .

**Soln: Use  $v = \sqrt{GM/R+h}$ . Put values & calculate (Ans:3046.485m/s = 3.05 km/s)**

IV. Complete the table

Reactions	Combustion reaction	Substitution reaction
Definition		Place of one type of atom/group in a reactant is taken by another atom/group
Example		

V. Given diagram is showing orbit of an artificial satellite .Answer the questions .

1. Which property of satellite decide height

and nature of satellite's orbit ? **Ans : Functions of satellite**

2. Critical velocity of the satellite is in which direction ?

**Ans : Critical velocity of the satellite is in tangential direction to the orbit.**

3. Attempt *any three* of the following questions :

[9]

I. Identify the concept explained in this para and answer the questions :

$\text{CH}_3 - \text{OH}$  ,  $\text{CH}_3 - \text{CH}_2 - \text{OH}$ ,  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{OH}$ ,  $\text{CH}_3 - \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{OH}$   
These series of compounds are having same functional group but different length of carbon chain. Their chemical properties are very much similar. Gradation in physical properties observed in such group of compounds.

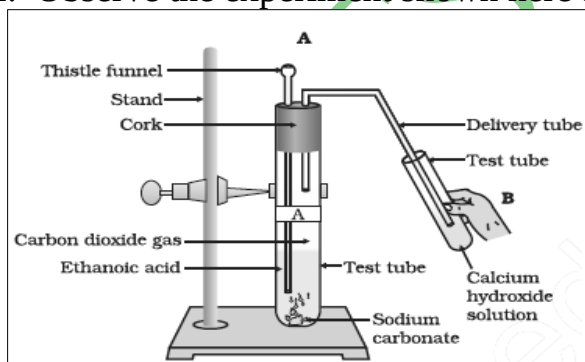
a) Which prominent property of carbon compounds is discussed here ?

**Ans : Homologous Series**

b) Explain this property . c) Give one more example.

**Ans : As given on textbook page no. 118**

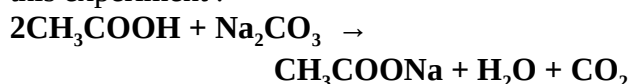
II. Observe the experiment shown here and answer the questions .



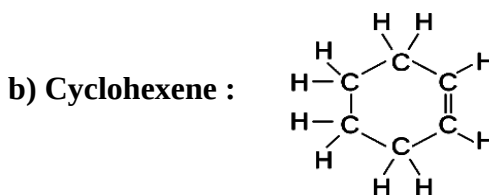
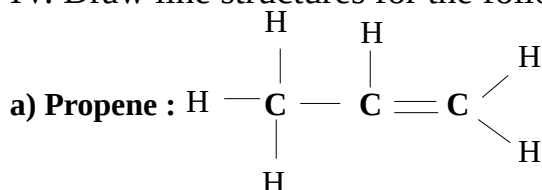
a) Which reactants are used here ? - **Sodium carbonate & Ethanoic acid**

b) What change will take place in the colour of lime water ? Why ? - **Lime water becomes milky due to  $\text{CO}_2$  gas.**

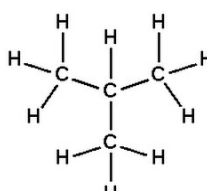
c) Write well balanced reactions taking place in this experiment .



IV. Draw line structures for the following carbon compounds



c) Isobutane :



IV. If the orbit of a satellite is 36720 km above the earth's surface and velocity of the satellite is 3.05 km/sec. How much time the satellite will take to complete one revolution around the earth ? (  $G = 6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$ ,  $R = 6400 \text{ km}$ )

**Sol:** Use  $v = \text{distance/time} = \text{circumference/time} = 2 \pi r / T = 2 \pi (R + h) / T$ .  
**Put values and calculate T ( Ans : 24 hrs 22 min)**

V. What is space debris ? Why it is necessary to manage space debris ?

**Ans : As given on textbook page no.143**

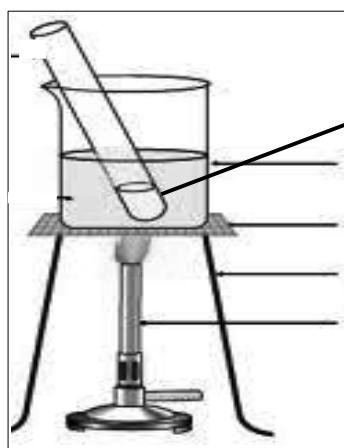
VI. Complete the chart and explain in short.

Polymer	Monomer	Structure	Use
Polyethylene	$\text{CH}_2 = \text{CH}_2$	$\text{---}[\text{CH}_2 - \text{CH}_2]_n\text{---}$	Carry bags ,wear
PVC	-----	$\text{---}[\text{CH}_2 - \text{CHCl}]_n\text{---}$	-----
Polyacrylo nitrile	-----	$\text{---}[\text{CN}-\text{CH}=\text{CH}_2]_n\text{---}$	Winter clothing

**4. Answer any one of the following questions :**

**[5]**

I. Observe the given reaction conditions and answer the questions :



**Mixture of Ethanoic Acid , Ethanol and Conc. Sulphuric Acid**

**Beaker**

**Wire Gauze**

**Stand**

**Burner**

a) Which reactants are used here ? - **Ethanoic Acid , Ethanol and Conc. Sulphuric Acid**

b) What will be the product of this reaction ? - **ethyl ethanoate , an ester.**

c) Which catalyst used here ? - **Conc. Sulphuric acid acts here as a catalyst.**

d) Write well balanced reaction for the same .



e) What are the uses of the product formed ?

**Ans : Esters are used in making fragrances,flavouring agents,soap.**

II. Explain structure and functioning of satellite launch vehicle with the help of neat labeled diagram. **Ans : As given on textbook page no. 140**

HPTS (2025-26)

**SCIENCE AND TECHNOLOGY PART – II**  
**{ Chap 9 : Social Health + Chap 10 : Disaster Management }**

**Time : 1<sup>1/2</sup> Hours**

**Total Marks : 30**

**Note :** 1.All questions are compulsory. 2.Draw scientifically, technically correct labeled diagrams wherever necessary. 3.Start writing each main question on new page. 4.Figures to the right indicate full marks . 5.For each MCQ (i.e. Q.No.1-A) evaluation would be done for first attempt only. 6.For each MCQ correct answer must be alphabet showing correct option. e.g. (I) (a) (II) (b) (III) (c)

**1 (A).Choose the correct alternative :**

**[5]**

I. Alcohol affects -----

(A) lungs (B) digestive track (C) heart **(D) nervous system**

II. Adolescents are under the influence of -----

(A) parents (B) teachers **(C) peer group** (D) neighbourhood

III. Rehabilitation is a part of ----- phase.

**(A) transitional** (B) terminal (C) ultimate (D) later

IV. Disasters always leads to damage -----

**(A) life & property** (B) communication & health  
 (C) society & local government (D) economy & ecology

V. Attack of virus is a ----- type of disaster.

(A) Geological (B) Unknown **(C) Biological** (D) International

**(B) Answer the following questions :**

**[5]**

I. Find the odd man out :

Gardening, Bird Watching, Linger in nature, **Indulging in selfie**, Rearing animals

II. Find whether the given statement is right or wrong .

‘Ability to change one’s own behaviour according to changing social conditions is an important characteristics of social health.’ **True**



III. Identify the sign :



**Ans :** This sign should not be ignored. It indicates inflammable material. It can catch fire easily if care is not taken while handling it.

IV. Name the type of disaster – Erosion **Geological disaster.**

V. Match the following :

Column I	Column II
1. tsunami <b>(b)</b>	(a) Atmospheric
2. snow-storms <b>(a)</b>	(b) Geological
	(c) Biological
	(d) Unknown

**2 (A). Give any one Scientific Reason :**

**[2]**

I. Importance of disaster management has become the foremost need of almost all the nations. **Reason :** Planet Earth has experienced many natural disasters. Huge loss to the life occurred due to such disasters. Generally, such conditions of natural imbalance have been arisen due to greed of economic progress of human being. Such disasters have been increased after the World War II . Condition of instability arises in the country due to various reasons like economic inequality, racial and religious differences etc. Incidences like terrorism, abduction, social differences have been a routine now. Production and use of harmful chemicals is under ban in developed countries. However, production of either same or those chemicals which can wipe out the human race is com

II. Girls are facing the problem of stress .

**Reason :** There are many bindings on girls. They are having compulsions for domestic duties on the pretext that 'should be used to it' . There is discrimination between sister and brothers on choice for fresh/left-over food, learning medium. Adolescent girls have to unnecessarily face the problems like teasing and molestation in the society. Due to such gender inequality mainly girls are .....

**(B) Attempt any two of the following questions :**

**[4]**

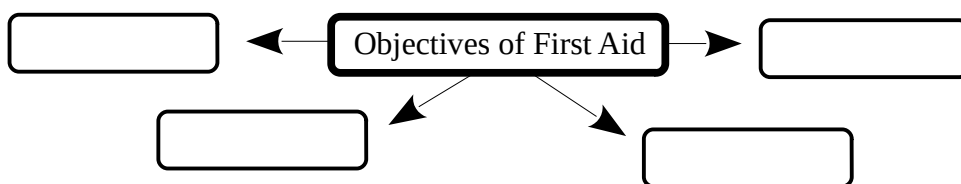
I. Observe the picture and answer the questions.



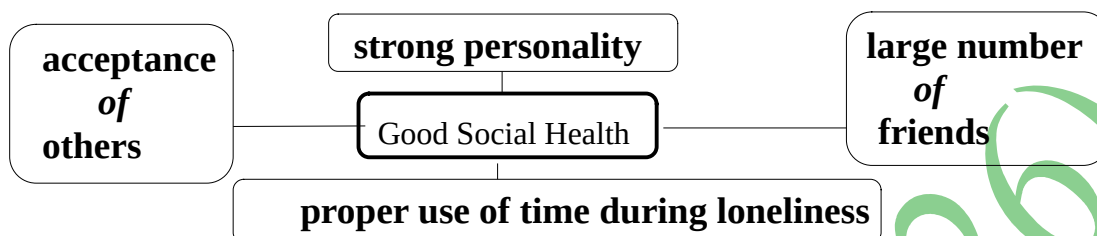
- What type calamity is shown in this picture?
- Suggest measures to manage such calamities.

**Ans :** It is a natural calamity.  
**Measures :** As given on textbook page no.114 (Pre disaster management and Post disaster management) (1<sup>1/2</sup> mark each)

II. Complete the flow chart :



III. Complete the concept map :



IV. Mock drill is arranged on disaster of fire in schools. What are the objectives of mock drills? **Ans : As given on textbook page no.118 (Any Four objectives)**

3. Attempt *any three* of the following questions :

[9]

I. Complete the chart and explain in short :



II. Write the meanings of following signs .



(a)



(b)



(c)

(a) **Sign of Health Hazard** : It indicates the substances that can cause hazard to our health. We should not keep them in proximity.

(b) **Sign of Environmentally Hazardous** :Some toxic,materials are hazardous to the environment. Air,water,soil can be polluted.Those should be used carefully and in a controlled way.

(c) **Sign of Irritant** : This indicates substances that can cause irritation, harmful reaction to the skin, eyes, nose etc.

III. Observe the picture and answer the questions.



**Ans :** It is 'Laughter club' a new popular concept (1 mark). The people relieve their mental stress by laughing loudly (1 mark)  
**Some more activities :** As given on textbook page no. 106 & 107 (1 mark )

- What are these senior citizens doing ?
- Why it is necessary to perform such activities ?
- Suggest some more similar useful activities ?

IV. What will you do if your friend is spending more time on mobile games.

**Ans :** Time is precious in our life. One must therefore use time for studies, playing, exercise, house hold work etc. If my friend is spending more time on mobile games, he is totally wasting his time. It also causes stress because there is no physical movement , no social interaction. I will talk with him about harmful effects of mobile gaming. I will motivate him and take him to the ground for playing , jogging etc. I will also tell his parents to keep him away from phone. I will also our teacher to guide and help him to avoid this bad habit.

V. Observe picture and answer the questions ::



- Which mental illness is shown in above picture ?
- Which social message will you give against this type of behavior ?

**Ans :** In picture, a young man is taking selfie while standing in the busy road. He is not aware of the approaching vehicles. **Social Message :** This is not a good behaviour . Such act may cause accidents. One should not indulge in a taking selfies every time. We should use technology in a proper way and at a proper place.

4. Answer the following question :

[5]

I. Explain the structure of Disaster Management Authority in detail with the help of concept map.

**Ans :** As given on textbook page no. 115 & 116

HPTS (2025-26)

**MATHS (PART – I)**

{ Chap : 3 + 4 }

**Time: 1<sup>1/2</sup> Hours****Max. Marks: 30**

**Note: 1. All questions are compulsory. 2. Use of calculator is not allowed. 3. Figures to the right of questions indicate full marks.**

**1.(A) Choose the correct alternative:****[3]****I. The sequence -2 , 1 , 4 , 6 , 9 , ..... is****a) not an A.P. b) is an A.P. with  $d=2$  c) is an A.P. with  $d= - 2$  d) is an A.P. with  $d=3$** **II. For an A.P. if  $t_n = 18$  ,  $n = 12$  ,  $d = 1$  then  $a = ?$** **a) 3      b) -7      c) -5      d) 7****III. If  $t_1 = 3$  ,  $t_n = 57$  and  $S_n = 900$  . What is the value of 'n' ?****a) 10      b) 45      c) 40      d) 30****IV. SAC in GST stands for -----****a) State Audit Code      b) Service Accounting Code  
c) Service Audit Cell      d) State Account Code****V. All goods in GST are classified by giving numerical code, the code is -----****a) GSTIN code      b) SGST code      c) SAC      d) HSN code****(B) Solve the following questions :****[3]****I. The first term 'a' and common difference 'd' are given. Find first three terms of A.P.  $a = -2$  ,  $d = 5$  Soln:  $t_1 = -2$  ,  $t_2 = -2 + 5 = 3$  ,  $t_3 = 3 + 5 = 8$  ( Ans : A.P. 2,3,8,...)****II. Find whether 209 is in the sequence 3,7,11,15,-----?****Soln : Find a & d . If 209 nth term, then use  $t_n = a + (n-1) \times d$  , put values & calculate, find 'n' ( Ans :  $n = 52.5$  . As 'n' is not an integer, 209 is not in the sequence)****III. Find whether given sequence is A.P. or not and find next two terms** **$5/3$  ,  $2/3$  ,  $- 1/3$  ,  $- 4/3$  , ----- ,-----,**

**Soln :** Find  $d$  by using  $t_2 - t_1$  ;  $t_3 - t_2$  and so on . ( Ans : As  $d = -1$  and is constant in this sequence. It is an A.P. ) Now find next two terms by using  $t_4 + d$  &  $t_5 + d$  ( Ans :  $-7/3$ ,  $-10/3$  )

**IV. Retailer paid GST of Rs.4700/- at the time of purchase and collected GST of Rs.6000/- at the time of sale. Find his payable GST.**

**Soln:** Output tax – 6000/- ; Input tax – 4700/- i.e. ITC = 4700/- ; GST payable = Output Tax – ITC 6000 – 4700 = 1300/- ( Ans : 1300/- )

**V. If 60 shares of FV Rs.10 were purchased at a premium of Rs.5 .Company declared 20% dividend on the shares .Then find total dividend received.**

**Soln :** FV = Rs. 10 , MV = Rs. 10 + 5 = 15 , Number of shares = 60 ,  
Dividend per share =  $10 \times 20/100$  = Rs. 2/- Total dividend received =  $60 \times 2$  = Rs .120/-

**2.(A) Complete the following activities (Any One):**

[2]

**I .Find  $t_n$  for A.P. : 7,12,17,22 , .... , .... and then find 15<sup>th</sup> term of A.P.**

**Activity :** A.P. : 7,12,17,22 , .... , ....

$$t_n = \boxed{t_{15}} , a = 7 , d = \boxed{5}$$

Now we will find ' $t_n$ '

$$t_n = a + (n - 1) \times d$$

$$t_{15} = 7 + (n - 1) \times \boxed{5}$$

$$t_{15} = 7 + \boxed{5n - 5}$$

$$t_{15} = 7 + (5 \times 15 - 5)$$

$$t_{15} = \boxed{77}$$

**II. Which term of the following A.P. is 144 . A.P. is 4 , 11 , 18 , 25 , --- ,----**

**Activity :** Given AP 4, 11, 18, 25,----,-----,

Here  $a = 4$  ,  $d = 11 - \boxed{4} = 7$

$n^{\text{th}}$  term of this AP is 144.

$$t_n = a + (n - 1) \times d$$

$$144 = 4 + (n - 1) \times \boxed{7}$$

$$144 = 4 + \boxed{7n - 7}$$

$$144 + 3 = 7n$$

$$\frac{147}{7} = n = \boxed{21}$$

Hence,  $t_{\boxed{21}} = 144$

III. Sumeet purchased 70 shares of MV Rs.50. Brokerage paid at the rate of 0.7% and rate of GST on brokerage is 18%. Find the total GST he paid .

Activity : Value of 70 shares =  $70 \times \boxed{50} = \text{Rs. } 3500/-$

Total Brokerage =  $\text{Rs. } 3500/- \times 0.7\% = \boxed{24.5}$

Now Total GST will be,

GST =  $18\% \times \boxed{24.5} \therefore \text{Total GST} = \boxed{\text{Rs. } 4.410}$

(B) Solve the following questions (Any Three) :

[6]

I. Find the sum of all even numbers from 1 to 125

Soln: A.P : 2,4,6,8,.....,124;  $a=2$ ,  $d=2$ . Use  $t_n = a + (n-1) \times d$ . put values & Find 'n'  
( Ans :  $n = 62$  ) Now find sum of all numbers by using  $S_n = n/2 [ 2a + (n-1)d ]$   
( Ans : 3906)

II. Find the 20<sup>th</sup> term of A.P. : 7 , 12 , 17 , 22 , ----- ?

Soln : Find  $t_{20}$  as shown in Activity (II) (Ans : 102)

III. If the first term of an A.P. is 5 and the common difference 2 .Then find  $S_{16}$

Soln : Use  $S_n = n/2 [ 2a + (n-1)d ]$ , Put values  $a = 5$ ,  $d = 2$ ,  $n = 16$  and calculate  $S_{16}$   
(Ans : 320)

IV. Vaishali invested Rs. 2,41,416 in shares of FV Rs.10 .If MV is 150 . Rate of brokerage is 0.5 % and GST is 18% .Then find the amount of brokerage paid and GST paid.

Soln : Sum invested Rs. 2,41,416/- Brokerage = 0.5% GST rate 18 % ;

Brokerage per share =  $150 \times 0.5/100 = 0.75$  GST per share on brokerage =  $18\% \text{ of } 0.75 = 0.135/-$

Cost of one share =  $150 + 0.75 + 0.135 = 150.885$  . Total shares =  $2,41,416 \div 150.885 = 1600$ .

(Total brokerage =  $1600 \times 0.75 = \text{Rs. } 1200/-$  & Total GST =  $1600 \times 0.135 = \text{Rs. } 216/-$ )

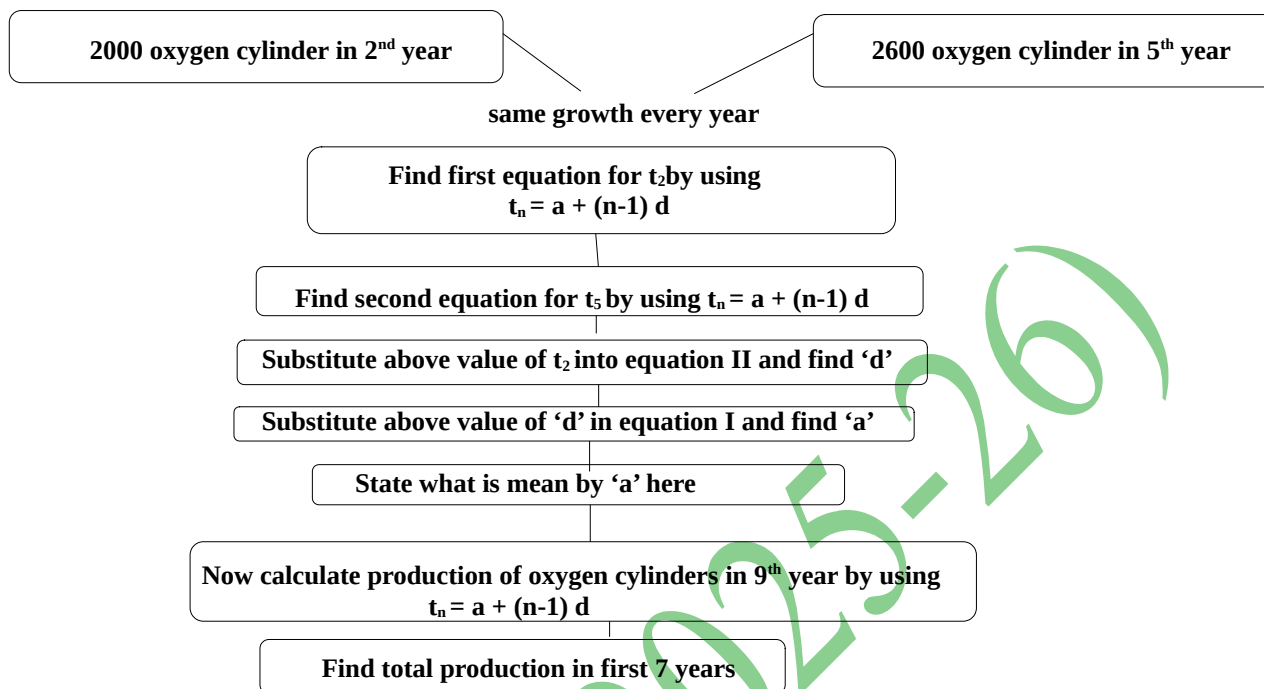
V. The value of watch is Rs. 590. The rate of GST is 18%. Then what is the price of watch for customer ?

Soln : GST = 96.80 , Price =  $590 + 96.80 = 686.80$

## 3 (A). Complete the following activity :

[3]

Follow given steps and complete the activity to find production of oxygen gas cylinder.

Ans: Follow above steps and calculate . ( Ans :  $d = 200$  ,  $a = 1800$  ,  $t_9 = 3400$  &  $S_7 = 16,800$ )

II. Rakesh bought 70 shares of FV Rs.100 , having MV Rs. 200 . Company gave 35% dividend on the shares . Find the rate of return on investment ?

Activity : FV of shares = Rs.  , MV of shares = Rs.

The dividend is 35% ; Dividend Rs.35 on investment of Rs. 200/-

$$\text{The rate of return on investment is} = \frac{\text{35}}{\text{200}} \times \text{100}$$

$$\text{The rate of return on investment is} = \text{17.5\%}$$

(B) Solve the following questions ( Any Two ):

[6]

I. In an A.P. the 15<sup>th</sup> term is 44 .The sum of the 6<sup>th</sup> and 8<sup>th</sup> term is 40 . Find the A.P.

Soln :  $t_{15} = 44$  ,  $t_6 + t_8 = 40$  , Using  $t_n = a + (n-1)d$  , we get  $t_{15} = 9 + (15-1)d$  ;

$a + 14d = 44$  ..... I;  $t_6 + t_8 = [a + (6-1)d] + [a + (8-1)d]$  ;  $40 = a + 5d + a + 7d$  ;

$40 = 2a + 12d$  ;  $a + 6d = 20$  .....II

subtracting eq. II from I, we get  $8d = 24$ ,  $d = 3$ ; We get  $a = 2$  by putting  $d = 3$  in eq. I

( A.P will be 2,5,8,11,14,..., .... )



II. Observe the diagram and find the area of 25<sup>th</sup> consecutive rectangle.

**Solution :** Find areas of all three rectangles . Then find 'a' and 'd'

Use  $t_n = a + (n - 1)d$  to find  $t_{25}$  . (Ans : Area of 1st rectangle = 12 sq.cm)

Area of 2nd rectangle = 30 sq.cm & Area of 3rd rectangle = 48 sq.cm )

( a = 12 , d = 18 ,  $t_{25}$  = 444 sq.cm )

III. How many two digit numbers are divisible by 5 ?

**Soln :** List of two digit numbers divisible by 5 is : 10,15,20,25 ..... 95

Find how many such numbers are there :  $t_n = 95$  , a = 10 , d = 5 .

Use  $t_n = a + (n - 1)d$  and find 'n' ( Ans : n = 18 )

IV. Rameena invested 9930 in the shares of FV Rs.10 when the MV was Rs. 90 .

She sold all the shares at MV of Rs.80 after taking 50% dividend .She paid 0.3 % brokerage at each stage of transactions. What was the total gain or loss in this transactions ?

**Soln:** FV = Rs.10 , MV = 90/-; Brokerage per share =  $0.3/100 \times 90 = 0.27$  ; Cost of one share =  $90 + 0.27 = 90.27/-$  ; Number of shares =  $9930/99.27 = 110$  ; shares sold : FV = Rs.10 .MV = Rs.80; Brokerage per share =  $0.3/100 \times 80 = 0.24$ ;selling price per share =  $80 - 0.24 = 79.76$ ;selling price of 110shares =  $79.76 \times 110 = 8773.60$ ;Dividend received = 50%, Dividend per share =  $50/100 \times 10 = 5$  . Dividend on 110 shares =  $110 \times 5 = 550/-$  ; Rameena's income =  $8773.60 + 550 = 9323.60$  .  
Loss =  $9930 - 9323.60 = \text{Rs. } 606.40$  .

V. Abdul invested in shares as follows .Find his total investment .

Company A : 300 shares , FV = Rs.10 , Premium = Rs. 10

Company B : 1540 shares ,FV = Rs.10 , Discount = Rs. 2

Company C : 160 shares , FV = Rs.100 , Premium = Rs.120 .

**Soln :** Company A : MV = FV + Premium =  $10 + 10 = \text{Rs. } 20/-$ .

Investment in Company A : No. of Shares x MV =  $300 \times 20 = 6000/-$

Find in same way investment in Company B and Company C.

Then find Total Investment by adding all three investments.

( Ans : B = MV = Rs. 8 /-, Investment = Rs. 12,320/-

C = MV = Rs. 220 /-, Investment = Rs. 35,200/-

Total Investment = Rs. 53,520/-)

4.Solve the following questions (Any One):

[4]

I. Observe given arrangements . In first arrangement there are total 25 circles and in second arrangement there are total 32 semicircles . Students if standing as shown in diagram , find which arrangement will accommodate more students and by how much number ?

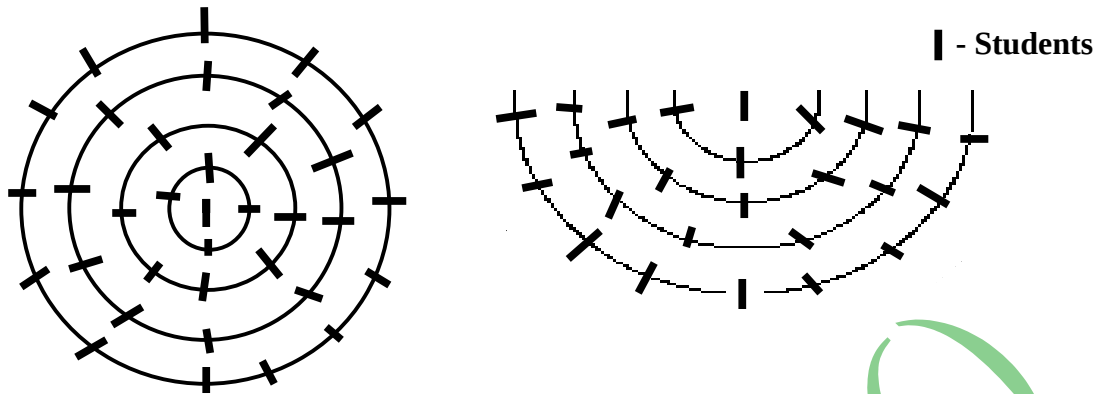
n

**Sol:** Use  $S_n = \frac{n}{2} [ 2a + (n - 1)d ]$  for both arrangements and Find  $S_{25}$  and  $S_{32}$  .

2

For  $S_{25}$  ; n = 25 , a = 1 , d = 3 and For  $S_{32}$  ; n = 32 , a = 1 , d = 2

Put values & calculate.(Ans :  $S_{25} = 925$  ;  $S_{32} = 1024$  . Second arrangement will accommodate 99 more students)



II. The 20<sup>th</sup> term and 29<sup>th</sup> term of an A.P. are 30 and 57 respectively . Then find 42<sup>th</sup> term.

Solution :  $t_{20} = 30$  ,  $t_{29} = 57$  find  $t_{42}$  by using  $t_n = a + (n - 1)d$

$$t_{20} = a + (20 - 1)d , 30 = a + 19d , a = 30 - 19d \text{ ----- I}$$

$$t_{29} = a + (29 - 1)d , 57 = a + 28d \text{ ----- II}$$

Substituting I into II

$$30 - 19d + 28d = 57 , 9d = 27 , d = 3 .$$

substituting  $d = 3$  in eq. I

$$a = 30 - 19 \times 3 , a = - 27 .$$

Now, use  $t_n = a + (n - 1)d$  , put values  $d = 3$  ,  $n = 42$  ,  $a = - 27$  and calculate  $t_{42}$

(Ans :  $t_{42} = 96$  )

III. Anil invested 12,500 when MV of the share was Rs.100 . He sold 40 shares when the MV was 120 and sold the remaining shares when the MV was Rs.70. He paid 0.1% brokerage for each trading. Find whether he made profit or loss and how much ?

5. Solve the following questions:

[3]

I. The sum of natural numbers from 1 to  $n$  is 78 . Find the value of  $n$  ?

Soln :  $S_n = 78$  ;  $a = 1$  ;  $d = 1$  (natural numbers); Use  $S_n = \frac{n}{2} [2a + (n-1)d]$  ; Put values and derive equation ( $n^2 + n - 156 = 0$ ) ; Solve this equation  $n^2 + 13n - 12n - 156 = 0$  ;  $(n + 13)(n - 12) = 0$ ; Find ' $n$ ' (Ans :  $n = 12$  )

II. Rohit invested 18,090 in the shares of FV Rs.10 when the MV Rs.90 .He sold all the shares at MV Rs.110/- after taking 30% dividend. He paid 0.5 % brokerage at each stage of transactions. What was the total gain or loss in this trading ?

**MATHS (PART – II)**  
**{ Chap : 5 + 6 }**

**Time: 1<sup>1/2</sup> Hours****Max. Marks: 30**

**Note:** 1. All questions are compulsory. 2. Use of calculator is not allowed.  
3. Figures to the right of questions indicate full marks.

**1.(A) Choose the correct alternative:****[3]**I. The value of  $\sin^2 45 + \cos^2 60$  is -----

- a) 1      **b) 3/4**      c)  $1/\sqrt{2}$       d)  $3/\sqrt{2}$

II.  $\sec \theta \times \cos \theta =$  -----

- a) 0      **b) 1**      c) 2      d)  $1/\sqrt{2}$

III. The point of concurrence divides the median in the ratio -----

- a) 3 : 2      b) 1 : 2      **c) 2 : 1**      d) 1 : 3

IV. If  $\cos (60^\circ - x) = \sin 60^\circ$ . Value of 'x' is -----

- a) 30°**      b) 90°      c) 60°      d) 45°

V. If the angle made by the line with the positive direction of X – axis is  $60^\circ$   
Then slope is ----- a) 1      **b) not defined**      c)  $\sqrt{3}$       d) 2

**(B) Solve the following questions :****[3]**

I. If  $\sin \theta = \frac{9}{15}$ . Find the value of  $\cos \theta$  using trigonometric identity.

**Soln :** Use  $\sin^2 \theta + \cos^2 \theta = 1$ . Put values and first calculate  $\cos^2 \theta$ .  
Then take square root of both sides and calculate  $\cos \theta$   
(Ans :  $\cos \theta = 12/15$ )

II. If  $\tan \theta = \frac{3}{4}$ , then find cosec  $\theta$  and sin  $\theta$ .

**Soln:**  $\cot \theta = 1/\tan \theta$  ;  $\cot \theta = 4/3$ ;  $1 + \cot^2 \theta = \text{cosec}^2 \theta$  ;  $1 + 16/9 = 25/9$   
(Ans : cosec  $\theta = 5/3$ )  
 $1/\text{cosec} \theta = \sin \theta$  ;  $1/(5/3)$  ( Ans : sin  $\theta = 3/5$  )

III. Prove that  $\cos^2 \theta (1 + \tan^2 \theta) = 1$

$$\begin{array}{l|l} \text{Soln : LHS : } \cos^2 \theta (1 + \tan^2 \theta) & (1)^2 = 1 \\ \cos^2 \theta (\sec^2 \theta) & \text{LHS} = \text{RHS} \\ (\cos \theta \times \sec \theta)^2 & \text{Hence Proved} \end{array}$$

IV. Find the slope of the line passing through points A ( 3 , 4 ), B ( 5 , 8 )

Sol: Use  $\frac{y_2 - y_1}{x_2 - x_1}$  put values and calculate . (Ans : 2)

V. Find k , if line passing through A ( -11,- 2 ) and B ( 7, k )

Sol:  $m = \frac{y_2 - y_1}{x_2 - x_1}$  ;  $1/3 = k - (-2) / 7 - (-11)$  ;  $1/3 = k + 2 / 7 + 11$  ;  $1/3 = k + 2/18$  ; Solve . (Ans: k =4)

2.(A) Complete the following activities (Any One):

[2]

I. Find the distance between following pairs of points.

A(3,4) ; B(5,2) by filling correct options.

**Activity** : Suppose co-ordinates of point A are  $(x_1, y_1)$  and of point B are  $(x_2, y_2)$

$$x_1 = 3, y_1 = 4$$

$$x_2 = \boxed{5}, y_2 = 2$$

By distance formula

$$\begin{aligned} AB &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \sqrt{(\boxed{5} - \boxed{3})^2 + (\boxed{2} - \boxed{4})^2} \\ &= \sqrt{(\boxed{2})^2 + (\boxed{-2})^2} \\ &= \sqrt{\boxed{4 + 4}} \\ &= \sqrt{\boxed{8}} \end{aligned}$$

II . Find x if distance between M ( x , 8 ) and N( 2 , 16 ) is 17 by completing following activity.

**Activity** : M ( x , 8 ) and N ( 2 , 16 )

$$MN = 17$$

By distance formula

$$\begin{aligned} MN &= \sqrt{(x - 2)^2 + (\boxed{8} - \boxed{16})^2} \\ 17 &= \sqrt{(x - 2)^2 + (\boxed{-8})^2} \end{aligned}$$

squaring both the sides , we get

$$289 = (x - 2)^2 + 64$$

$$(x - 2)^2 = 225$$

Take square roots of both sides

$$x - 2 = \pm 15$$

$$\text{Either } x - 2 = 15 \quad \text{or} \quad x - 2 = -15$$

$$x = 17 \quad \text{or} \quad x = -13$$

III. If  $\sec \theta = 25 / 7$ , then  $\tan \theta = ?$

**Activity :**  $1 + \tan^2 \theta = \sec^2 \theta$

$$1 + \tan^2 \theta = (25 / 7)^2$$

$$\tan^2 \theta = \frac{625}{49} - 1$$

$$\tan^2 \theta = \frac{625 - 49}{49} = \frac{576}{49}$$

$$\tan \theta = 24 / 7$$

**(B) Solve the following questions :**

[6]

I. Prove that ,  $\cot^4 \theta + \cot^2 \theta = \operatorname{cosec}^4 \theta - \operatorname{cosec}^2 \theta$

**Sol:**  $\cot^4 \theta + \cot^2 \theta$

$\cot^2 \theta (\cot^2 \theta + 1)$

$\cot^2 \theta \times \operatorname{cosec}^2 \theta$

As  $1 + \cot^2 \theta = \operatorname{cosec}^2 \theta$

$(\operatorname{cosec}^2 \theta - 1) \times \operatorname{cosec}^2 \theta$

$\operatorname{cosec}^4 \theta - \operatorname{cosec}^2 \theta$

**LHS = RHS**

$\cot^4 \theta + \cot^2 \theta = \operatorname{cosec}^4 \theta - \operatorname{cosec}^2 \theta$

II. If  $8 \sin \theta + 15 \cos \theta = 0$  Find the value of  $\sec \theta$ .

**Sol:**  $8 \sin \theta + 15 \cos \theta = 0$

$$8 \sin \theta = 15 \cos \theta$$

$$\sin \theta / \cos \theta = 15 / 8$$

$$\tan \theta = 15/8$$

$$1 + \tan^2 \theta = \sec^2 \theta$$

$$1 + (15/8)^2 = \sec^2 \theta$$

$$1 + (225/64) = \sec^2 \theta$$

$$\underline{64 + 225} = \sec^2 \theta$$

$$289$$

$$\frac{289}{64} = \sec^2 \theta \quad (\text{Ans : } \sec \theta = 17 / 8)$$

III. Find the coordinates of the points of trisection of the line segment AB with A( 3,8) and B (-3,-7). **Soln:** A( 3,8) and B (-3,-7). Let P ( $x_1, y_1$ ) and Q ( $x_2, y_2$ ).  $AP = PQ = QB$

$$\frac{AP}{PB} = \frac{AP}{PQ + QB} \quad \text{---- (P-Q-B)}$$

$$\frac{AP}{PB} = \frac{AP}{AP + AP} ;$$

$$\frac{AP}{PB} = \frac{AP}{2AP} = \frac{1}{2} ; \text{ P divides segment in the ratio } 1 : 2.$$

Now find  $x_1$  and  $y_1$  by using section formula (Ans :  $x_1 = 1$  ,  $y_1 = 3$  ; P ( 1,3) )

$$\frac{AQ}{QB} = \frac{AP + PQ}{QB} \quad \text{---- (A -P-Q)}$$

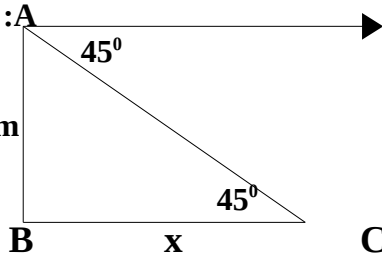
$$\frac{AQ}{QB} = \frac{QB + QB}{QB} ;$$

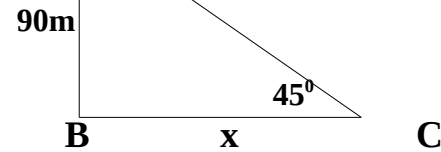
$$\frac{AQ}{QB} = \frac{2QB}{QB} = \frac{2}{1} ; \text{ Q divides segment in the ratio } 2 : 1$$

Now find  $x_2$  and  $y_2$  by using section formula (Ans :  $x_2 = -1$  ,  $y_2 = -2$  ; Q ( -1,-2) )

(Ans : Coordinates of trisection are ( 1,3) and ( -1,-2) )

IV. From the top tower a jawan is watching military camp with an angle of depression  $45^\circ$ . If the height of the tower is 90m . Find how far the camp is from tower?

Sol : A  Jawan is at A , Camp is at C .We are finding distance BC.  
 $\tan 45 = AB/BC$  ;  $1 = 90/x$  ;  $x = 90 / 1$  ;  $x = 90 \text{ m}$



3 (A). Complete the following activity :

[3]

I.  $\cos \theta = \frac{1}{\sqrt{2}}$  . then find the value of  $\frac{1 - \operatorname{cosec} \theta}{1 + \sec \theta}$  by filling appropriate options.

**Activity :**  $\cos \theta = \frac{1}{\sqrt{2}}$

$$\sec \theta = \boxed{\sqrt{2}}$$

$$\sin^2 \theta + \cos^2 \theta = 1$$

$$\sin^2 \theta + \boxed{(1/\sqrt{2})^2} = 1$$

$$\sin^2 \theta = 1 - \boxed{1/2} = \frac{1}{2}$$

$$\sin \theta = \boxed{1/\sqrt{2}}$$

$$\operatorname{cosec} \theta = \boxed{\sqrt{2}}$$

$$\frac{1 - \operatorname{cosec} \theta}{1 + \sec \theta} = \frac{1 - (\boxed{\sqrt{2}})}{1 + \sqrt{2}}$$

II. In  $\Delta PQR$ , O (-2,-5) is the centroid. If P (-12,-17) and Q (5,7) .Then find the 'x' coordinate of R by completing following activity .

**Activity :** P ( -12 , -17 ) , Q ( 5 , 7 ) , O ( -2 , -5 )

Suppose p has coordinates (x<sub>1</sub>,y<sub>1</sub>) ,Q has coordinates (x<sub>2</sub>,y<sub>2</sub>) and R has coordinates (x<sub>3</sub>,y<sub>3</sub>) and O has coordinates (x,y)

By centroid formula ,

$$x = \frac{x_1 + \boxed{x_2} + \boxed{x_3}}{3}$$

$$-2 = \frac{\boxed{-12} + \boxed{5} + \boxed{x3}}{3}$$

$$\boxed{-6} = \boxed{-7} + \boxed{x3}$$

$$x3 - 1$$

(B) Solve the following questions :

[6]

I. Prove :  $\frac{\cot^3 \theta - 1}{\cot \theta} = \frac{\sin^2 \theta + \tan \theta}{\sin^2 \theta \times \tan \theta}$

Sol:  $\frac{(\cot \theta - 1)(\cot^2 \theta + \cot \theta + 1)}{\cot \theta - 1} = \cot^2 \theta + 1 + \cot \theta = \operatorname{cosec}^2 \theta + \cot \theta = \operatorname{cosec}^2 \theta + 1/\tan \theta ;$

$1/\sin^2 \theta + 1/\tan \theta ; \sin^2 \theta + \tan \theta / \sin^2 \theta \times \tan \theta$ . LHS = RHS

( Ans : Hence Proved )

II. Verify that points A (-3,3) B (3,3) and C (3,8) are vertices of a right angled triangle

Sol : Use distance formula and find AB,BC and AC

( Ans : AB = 6, BC = 5 , AC =  $\sqrt{61}$  )

Then find whether  $AB^2 + BC^2 = AC^2$  or not

( Ans :  $AB^2 + BC^2 = 61, AC^2 = 61$  )

Hence by converse of Pythagoras Theorem ,  $\Delta ABC$  is right angled triangle.

III. From the top of a building, an observer looking at a car makes angle of depression of  $70^\circ$ . If the height of the lighthouse is 70 m. Then find how far the car is from the building. (  $\tan 70^\circ = 2.75$  ) Ans:  $\tan \theta = 70/x ; \tan 70 = 70/x \Rightarrow x = 70/1.22 = 57.38 \text{ m}$

4. Solve the following questions (Any One):

[4]

I. Prove the following :

$$\sec \theta (1 + \sin \theta) (\cot \theta) = \frac{\sec \theta}{\tan \theta} + 1$$

Solution : LHS =  $\sec \theta (1 + \sin \theta) (\cot \theta)$

$$= (\sec \theta + \sec \theta \cdot \sin \theta) (\cot \theta)$$

$$= \left( \sec \theta + \frac{1}{\cos \theta} \cdot \sin \theta \right) (\cot \theta)$$



$$\begin{aligned}
 &= \left( \sec \theta + \frac{\sin \theta}{\cos \theta} \right) \left( \frac{1}{\tan \theta} \right) \\
 &= (\sec \theta + \tan \theta) \left( \frac{1}{\tan \theta} \right) \\
 &= \frac{\sec \theta + \tan \theta}{\tan \theta} = \frac{\sec \theta}{\tan \theta} + 1 \\
 &\text{LHS} = \text{RHS}
 \end{aligned}$$

$$\left[ \text{Ans : Hence Proved : } \sec \theta (1 + \sin \theta) (\cot \theta) = \frac{\sec \theta}{\tan \theta} + 1 \right]$$

II. Find the lengths of the medians of a triangle whose vertices are A( 2,2) ; B( 4,2) ; C ( 2, 4) **Solution :** A (2,2) ; B ( 4, 2) ; C ( 2, 4) ,

Now , consider midpoints say, D( x<sub>1</sub>, y<sub>1</sub>), E(x<sub>2</sub>, y<sub>2</sub>), F (x<sub>3</sub>,y<sub>3</sub>) of sides BC, AC and AB

Now find x<sub>1</sub> and also y<sub>1</sub> by using midpoint formulas

(Ans : x<sub>1</sub> = 3 and y<sub>1</sub> = 3 ; D (3,3)).

Now in the same find x<sub>2</sub>,y<sub>2</sub> and x<sub>3</sub>,y<sub>3</sub>

(Ans : x<sub>2</sub> = 2 ,y<sub>2</sub> = 3 ,x<sub>3</sub> = 3 , y<sub>3</sub> = 2 ; E(2,3) , F(3,2) )

Now find length of median AD by using distance formula (Ans :  $\sqrt{2}$ )

Now find length of median BE by using distance formula (Ans :  $\sqrt{5}$ )

Now find length of median CF by using distance formula (Ans :  $\sqrt{5}$ )

III. Fighter plane at a height of 580 m from earth , made an angle of depression of 45° and bombarded a special missile which destroyed target at say C . In another attempt it destroyed target at D from same height and same point but by decreasing an angle of depression by 15°. Find how far is the second target from first target. (  $\sqrt{3} = 1.73$  )

**Sol :**  $\tan 45^\circ = AB/BC$  ;  $BC = 580/\tan 45 = 580/1 = 580$  m ;

$\tan 30^\circ = AB/BD$  ;  $1/\sqrt{3} = 580/BD$  ;  $BD = 580 \times \sqrt{3}$  ;  $BD = 580 \times 1.73 = 1003.4$  m

Distance of second target from first target =  $1003.4 - 580 = 423.4$  m

5. Solve the following questions ( any one ) :

[3]

I. Find whether  $\sec^4 A (1 - \sin^4 A) - 2 \tan^2 A = 1$  or not ?

**Soln :**  $\sec^4 A (1 - \sin^4 A) - 2 \tan^2 A = \sec^4 A - \sec^4 A \cdot \sin^4 A - 2 \tan^2 A$

$1/\cos^4 A - 1/\cos^4 A \cdot \sin^4 A - 2 \sin^2 A / \cos^2 A$

$1/\cos^4 A - \sin^4 A / \cos^4 A - 2 \sin^2 A / \cos^2 A$

$1 - \sin^4 A / \cos^4 A - 2 \sin^2 A / \cos^2 A$

$1 - (\sin^2 A)^2 / \cos^4 A - 2 \sin^2 A / \cos^2 A$

$(1 - \sin^2 A) (1 + \sin^2 A) / \cos^4 A - 2 \sin^2 A / \cos^2 A$

$\cos^2 A (1 + \sin^2 A) / \cos^4 A - 2 \sin^2 A / \cos^2 A$

$1 - \sin^2 A / \cos^2 A$  ;  $\cos^2 A / \cos^2 A = 1$

LHS = RHS

II. Find whether points P (1,-1) ,Q (4,2) , R ( 1,-2 ) , S ( -2,-5 ) are the vertices of a parallelogram or not

( Ans :  $PQ = 3\sqrt{2}$  ,  $QR = 5$  ,  $RS = 3\sqrt{2}$  ,  $PS = 5$  )

As  $PQ = RS$  and  $QR = PS$  ,  $\square$  PQRS is a parallelogram. Hence points P(1,-1) ,Q(4,2) ,R(1,-2) , S(-2,-5) are the vertices of a parallelogram.

HPTS (2025-26)