

Section IAnswer All The Questions.Question 1

(a)  $P(3, 2)$  divides the line segment  $MN$  in [3]  
the ratio  $2:3$ . find

(i) the coordinates of  $M$  and  $N$

(ii) slope of the line  $MN$

(b) Prove that: [3]

$$(\operatorname{cosec} \theta - \sin \theta)(\sec \theta - \cos \theta)(\tan \theta + \cot \theta) = 1$$

(c) Given  $A = \begin{bmatrix} 2 & 0 \\ -1 & 7 \end{bmatrix}$  and  $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$  [4]

and  $A^2 = 9A + mI$ . Find 'm'.

Question 2

(a) Using the factor theorem, show that [3]  
 $(x-2)$  is a factor of  $x^3 + x^2 - 4x - 4$ .  
Factorize the polynomial completely.

(b) Solve the following inequation and [3]  
write down the solution set:

$$11x - 4 < 15x + 4 \leq 13x + 14$$

$$x \in W$$

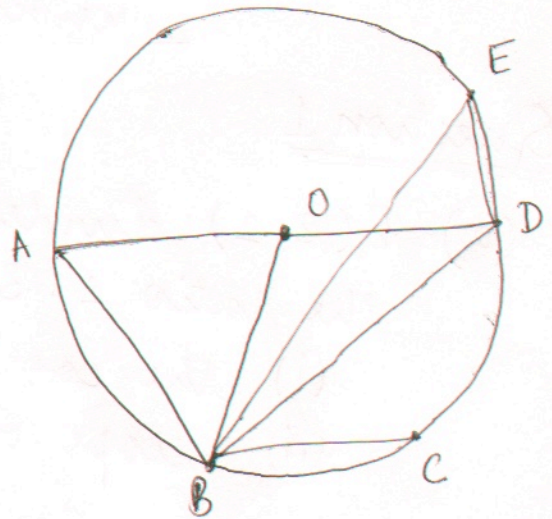
(c) In the figure given below, AD is the diameter. O is the center of the circle, AD is parallel to BC and  $\angle CBD = 32^\circ$ . [4]

Find:

(i)  $\angle OBD$

(ii)  $\angle AOB$

(iii)  $\angle BED$



### Question 3

(a) A game of numbers has cards marked with 11, 12, 13 ..... 40. A card is drawn at random. Find the probability that the number on the card drawn is: [3]

(i) A perfect square

(ii) Divisible by 7

(b) Mr. Rohit opened a recurring deposit account for 20 months. The rate of interest is 9% per annum & Mr. Rohit receives Rs 441 as interest at the time of maturity. Find the amount Mr. Rohit deposited each month. [3]

(c) Use a graph ~~the~~ sheet for this question [4]  
Take 1 cm = 1 unit, along both axis.

- (i) Plot : A (0,5), B (3,0), C (1,0), D (1, -5)
- (ii) Reflect the points B, C, D on the y axis and name them as B', C' and D'.
- (iii) Write down the coordinates of B', C', D'.
- (iv) Join the points A, B, C, D, D', C', B', A in order and give a name to the closed figure ABCDD'C'B'.

#### Question 4

(a) In a class of 40 students, marks obtained [4]  
by the students in a class test (out of 10)  
are given below:

|                |   |   |   |   |   |    |   |   |   |    |
|----------------|---|---|---|---|---|----|---|---|---|----|
| Marks          | 1 | 2 | 3 | 4 | 5 | 6  | 7 | 8 | 9 | 10 |
| No of Students | 1 | 2 | 3 | 3 | 6 | 10 | 5 | 4 | 3 | 3  |

Calculate:

(i) Median

(ii) Mode

(b) A man invests Rs 4500 in shares of a company which is paying 7.5% dividend. If Rs 100 shares are available at a Discount of 10%; find

(i) Number of shares he purchases. [3]

(ii) His annual Income.

- (c) A solid metallic sphere of radius 6 cm is melted and made into a solid cylinder of height 32 cm. Find the [3]
- Radius of the cylinder
  - Curved surface area of the cylinder

END OF SECTION - I

### Section - 2

Answer Any four Questions

#### Question 5

- (a) The sum of the first three terms of an Arithmetic Progression is 42 and the product of the first & third term is 52. Find the first term & the common difference. [3]
- (b) The vertices of  $\triangle ABC$  are  $A(3, 8)$ ,  $B(-1, 2)$  and  $C(6, -6)$ . Find [3]
- Slope of BC
  - Equation of the line perpendicular to BC and passing through A
- (c) Given  $\begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix} M = 6I$ , where  $M$  is a matrix &  $I$  is a unit matrix of the order  $2 \times 2$
- State the order of matrix  $M$
  - Find the matrix  $M$

### Question 6

(a) Using a ruler & compass construct  $\triangle ABC$  in which  $AB = 7\text{cm}$ ,  $\angle CAB = 60^\circ$  and  $AC = 5\text{cm}$ .

Construct the locus of

(i) Points equidistant from AB and AC [3]

(ii) points equidistant from BA and BC

Hence construct a circle touching the ~~base~~ three sides of the triangle internally

(b) If  $\frac{7m + 2n}{7m - 2n} = \frac{5}{3}$ , Use properties of

proportion to find :

(i)  $m : n$

(ii)  $\frac{m^2 + n^2}{m^2 - n^2}$

[4]

(c) A conical tent can accommodate 77 people. Each person must have  $16\text{m}^3$  of air to breathe. Given  $r = 7\text{m}$ . Find

(i) height of the tent

(ii) surface area of the tent  
(curved surface area)

[3]

## Question 7

(a) If  $\frac{x}{a} = \frac{y}{b} = \frac{z}{c}$ , show that

[3]

$$\frac{x^3}{a^3} + \frac{y^3}{b^3} + \frac{z^3}{c^3} = \frac{3xyz}{abc}$$

(b) Prove that  $\frac{\cos A}{1 + \sin A} + \tan A = \sec A$  [3]

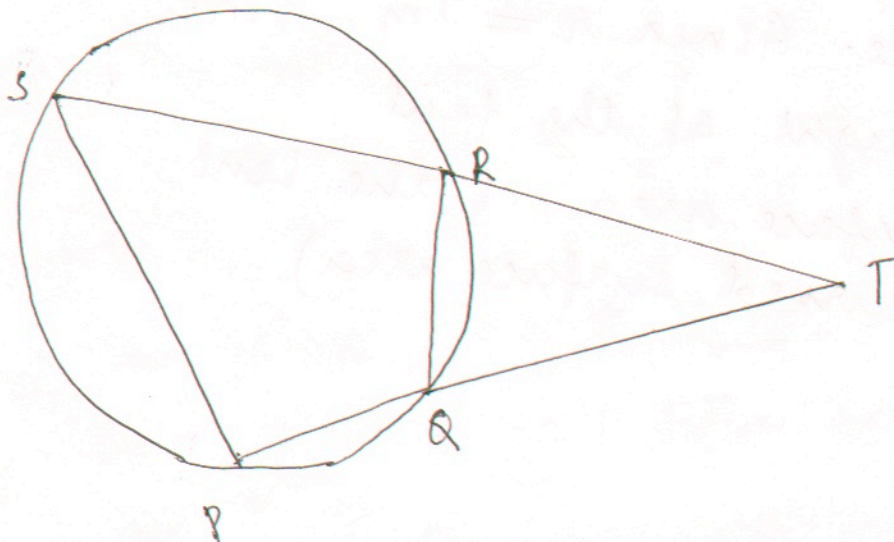
(c) In the given figure PQRS is a cyclic quadrilateral. PQ and SR produced to meet at T.

(i) Prove that  $\Delta TPS \sim \Delta TRQ$

[4]

(ii) Find SP if  $TP = 18\text{cm}$ ,  $RQ = 4\text{cm}$  and  $TR = 6\text{cm}$

(iii) Find the area of the quadrilateral PQRS; Given that area of  $\Delta PTS = 27\text{cm}^2$



## Question 8

(a) Use a graph paper for this question.

A survey regarding height (in cm) of 60 boys belonging to class 10 of a school was conducted. The following data was recorded. [6]

|              |           |           |           |           |           |           |           |
|--------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Height in cm | 135 - 140 | 140 - 145 | 145 - 150 | 150 - 155 | 155 - 160 | 160 - 165 | 165 - 170 |
| No. of Boys  | 4         | 8         | 20        | 14        | 7         | 6         | 1         |

Taking 2 cm = height of 10 cm along one axis and 2 cm = 10 boys along the other axis draw an ogive of the above distribution. Use the graph to find

(i) the median

(ii) lower Quartile

(iii) if above 158 cm is considered as the tall boys of the class. Find the no of tall boys in the class.

(b) The fourth term in the A.P is 22 and 15<sup>th</sup> term is 66. Find the first term and common difference. Hence, find the sum of the series to 8 terms [4]

## Question 9

- (a) Using properties of proportion, solve for  $x$ , for  $x > 0$  (3)

$$\frac{2x + \sqrt{4x^2 - 1}}{2x - \sqrt{4x^2 - 1}} = 4$$

- (b) Sachin invests Rs 8500 in 10%, Rs 100 shares at Rs 170. He sells the shares when the price of each share rises by Rs 30. He then invests the proceedings in 12% Rs 100 shares at Rs 125. Find

- (i) the sale proceedings. [4]  
(ii) the number of Rs 125 shares he buys.  
(iii) the change in his annual income

- (c) The model building is constructed with the scale 1:30

- (i) If the height of the model is 80 cm, find the actual height of the building in meters.  
(ii) If the actual volume of the tank is  $27 \text{ m}^3$ , find the volume of the model tank. [3]



### Question 10

(a) Solve the quadratic equal  $x^2 - 3(x+3) = 0$   
Give your answer correct two significant figures. [3]

(b) Given matrix  $A = \begin{bmatrix} 4 \sin 30^\circ & \cos 0^\circ \\ \cos 0^\circ & 4 \sin 30^\circ \end{bmatrix}$

and  $B = \begin{bmatrix} 4 \\ 5 \end{bmatrix}$

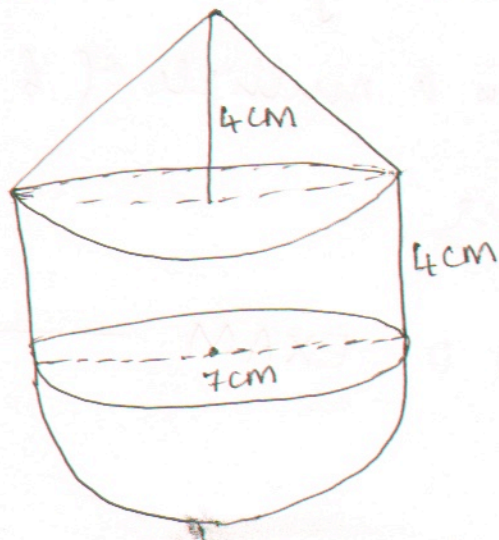
[3]

If  $AX = B$

(i) Write the order of matrix 'X'

(ii) Find matrix 'X'

(c) The following solid consists of a right circular cylinder with a hemisphere at one end and a cone at the other end. Their common radius is 7cm. The height of the cylinder and cone is 4cm each. Find the volume of the solid. [4]



## Question 11

(a) In  $\triangle PQR$ ,  $MN$  is parallel to  $QR$  and

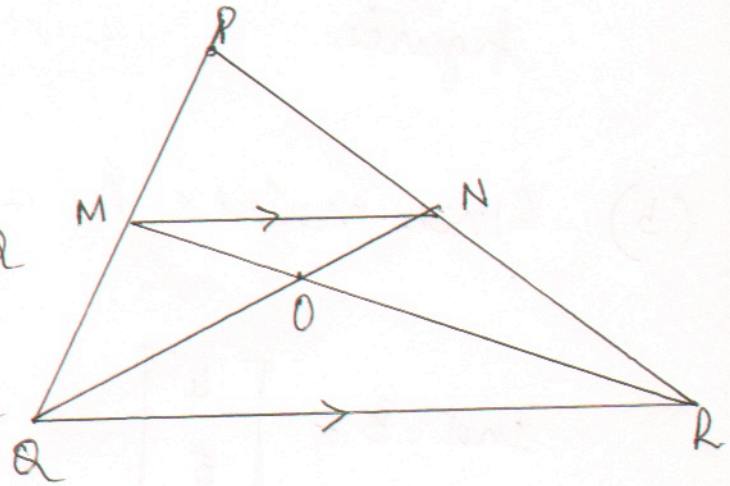
$$\frac{PM}{MQ} = \frac{2}{3} \quad \text{Find}$$

[3]

(i)  $\frac{MN}{QR}$

(ii) Prove  $\triangle OMN$  and  $\triangle ORQ$  are similar

(iii) Area of  $\triangle OMN$  &  $\triangle ORQ$



(b) Solve the inequation, write the solution set and represent it on the number line

$$-2 + 10x \leq 13x + 10 < 24 + 10x$$

$$x \in \mathbb{Z}$$

[3]

(c) Cards bearing numbers 2, 4, 6, 8, 10, 12, 14, 16, 18 and 20 are kept in a bag. A card is drawn at random. Find the probability of

(i) a prime number

(ii) a number divisible by 4

(iii) a number that is a multiple of 6

(iv) an odd number

[4]

END OF EXAM