

# SECOND MID TERM TEST - 2024

Standard X

Reg.No. 

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## MATHEMATICS

Time : 1.30 hrs

Part - I

Marks : 50

I. Choose the correct answer:

7 x 1 = 7

1. If 'A' is a 2 x 3 matrix, and 'B' is a 3 x 4 matrix, how many columns does AB have?

- a) 3                      b) 4                      c) 2                      d) 5

2. Find the matrix 'X' if  $2X + \begin{pmatrix} 1 & 3 \\ 5 & 7 \end{pmatrix} = \begin{pmatrix} 5 & 7 \\ 9 & 5 \end{pmatrix}$

- a)  $\begin{pmatrix} -2 & -2 \\ 2 & -1 \end{pmatrix}$               b)  $\begin{pmatrix} 2 & 2 \\ 2 & -1 \end{pmatrix}$               c)  $\begin{pmatrix} 1 & 2 \\ 2 & 2 \end{pmatrix}$               d)  $\begin{pmatrix} 2 & 1 \\ 2 & 2 \end{pmatrix}$

3. If the ratio of the height of a tower and the length of its shadow is  $\sqrt{3} : 1$ , then the angle of elevation of the sun has measure

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

4. A tower is 60 m height. Its shadow reduces by 'x' metres. When the angle of elevation of the sun increases from  $30^\circ$  to  $45^\circ$ , then 'x' is equal to \_\_\_\_\_

- a) 41.92 m                      b) 43.92 m                      c) 43 m                      d) 45.6 m

5. The height of a right circular cone whose radius is 5 cm and slant height is 13 cm will be \_\_\_\_\_

- a) 12 cm                      b) 10 cm                      c) 13 cm                      d) 5 cm

6. The curved surface area of right circular cone of height 15 cm and base diameter 16 cm is \_\_\_\_\_

- a)  $60\pi \text{ cm}^2$                       b)  $68\pi \text{ cm}^2$                       c)  $120\pi \text{ cm}^2$                       d)  $136\pi \text{ cm}^2$

7. Graph of a quadratic equation is a \_\_\_\_\_

- a) straight line                      b) circle                      c) parabola                      d) hyperbola

Part - II

II. Answer any 5 questions. (Q.No.14 is compulsory)

5 x 2 = 10

8. Construct a 3 x 3 matrix, whose elements are given by  $a_{ij} = |i - 2j|$

9. If  $A = \begin{pmatrix} 1 & 9 \\ 3 & 4 \\ 8 & -3 \end{pmatrix}$   $B = \begin{pmatrix} 5 & 7 \\ 3 & 3 \\ 1 & 0 \end{pmatrix}$ , verify  $A + B = B + A$ .

10. A tower stands vertically, on the ground. From a point on the ground, which is 48 m away from the foot of the tower, the angle of elevation of the top of the tower is  $30^\circ$ . Find the height of the tower.

11. From the top of a tree of height 13 m, the angle of elevation and depression of the top and bottom of another tree are  $45^\circ$  and  $30^\circ$  respectively. Find the height of the second tree. ( $\sqrt{3} = 1.732$ )

12. If the total surface area of a cone of radius 7 cm and  $704 \text{ cm}^2$ . Find its slant height.

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13. Find the diameter of a sphere whose surface area is  $154 \text{ cm}^2$ .

14. If  $A = \begin{pmatrix} 1 & 4 & 9 \\ 4 & 16 & 36 \\ 9 & 36 & 81 \end{pmatrix}$ , show that  $(A^T)^T = A$

## Part - III

III. Answer any 5 questions. (Q.No.21 is compulsory)

5 x 5 = 25

15. Define the following matrices with examples.

- Diagonal matrix of  $3 \times 3$  order. (2 marks)
- Scalar matrix of  $4 \times 4$  order. (2 marks)
- Identity matrix of  $3 \times 3$  order. (1 mark)

16. If  $A = \begin{pmatrix} 7 & 8 & 6 \\ 1 & 3 & 9 \\ -4 & 3 & -1 \end{pmatrix}$   $B = \begin{pmatrix} 4 & 11 & -3 \\ -1 & 2 & 4 \\ 7 & 5 & 0 \end{pmatrix}$ , then find  $2A + B$

17. If  $A = \begin{pmatrix} 1 & 1 \\ -1 & 3 \end{pmatrix}$   $B = \begin{pmatrix} 1 & 2 \\ -4 & 2 \end{pmatrix}$   $C = \begin{pmatrix} -7 & 8 \\ 3 & 2 \end{pmatrix}$ , verify that  $A(B + C) = AB + AC$

18. Two ships are sailing in the sea, on either sides of a lighthouse. The angle of elevation of the top of the lighthouse as observed from the ships are  $30^\circ$  and  $45^\circ$  respectively.

If the lighthouse is 200 m height, find the distance between the two ships. ( $\sqrt{3} = 1.732$ )

19. A statue 1.6 m tall stands on the top of a pedestal. From a point on the ground, the angle of elevation of the top of the statue is  $60^\circ$  and from the same point the angle of elevation of the top of the pedestal is  $40^\circ$ . Find the height of the pedestal.

( $\tan 40^\circ = 0.8391$ ,  $\sqrt{3} = 1.732$ )

20. The radius and height of a cylinder are in the ratio 5:7 and its curved surface area is  $5500 \text{ cm}^2$ . Find its radius and height.

21. a) If the radii of a circular ends of a frustum which is 45 cm high are 28 cm and 7 cm. Find the volume of a frustum.

(OR)

b) State and prove Pythagoras Theorem.

## Part - IV

IV. Answer any one of the following.

1 x 8 = 8

22. a) Draw the graph of  $x^2 - 9x + 20 = 0$  and state the nature of their solutions.

(OR)

b) Take a point which is 11 cm away from the centre of a circle of radius 4 cm and draw two tangents to the circle from that point.

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