

## SECOND MID TERM TEST - 2023

Standard X

Reg.No. 

--	--	--	--	--

### MATHEMATICS

**Time : 1.30 hrs**

**Marks : 50**

**I. Choose the correct answer:**

**7 x 1 = 7**

1. For the given matrix  $A = \begin{bmatrix} 1 & 3 & 5 & 7 \\ 2 & 4 & 6 & 8 \\ 9 & 11 & 13 & 15 \end{bmatrix}$  the order of the matrix  $A^T$  is
- a)  $2 \times 3$                       b)  $3 \times 2$                       c)  $3 \times 4$                       d)  $4 \times 3$
2. If number of columns and rows are not equal in a matrix then it is said to be a
- a) diagonal matrix                      b) rectangular matrix
- c) square matrix                      d) identity matrix
3. A tangent is perpendicular to the radius at the
- a) centre                      b) point of contact                      c) Infinity                      d) chord
4. The two tangents from an external points P to a circle with centre at O are PA and PB. If  $\angle APB = 70^\circ$  then the value of  $\angle AOB$  is
- a)  $100^\circ$                       b)  $110^\circ$                       c)  $120^\circ$                       d)  $130^\circ$
5. The electric pole subtends an angle of  $30^\circ$  at a point on the same level as its foot. At a second point 'b' meters above the first, the depression of the foot of the pole is  $60^\circ$ . The height of the pole (in metres) is equal to
- a)  $\sqrt{3} b$                       b)  $\frac{b}{3}$                       c)  $\frac{b}{2}$                       d)  $\frac{b}{\sqrt{3}}$
6. If two solid hemispheres of same base radius 'r' units are joined together along their bases, then curved surface area of this new solid is
- a)  $4\pi r^2$  sq.units                      b)  $6\pi r^2$  sq.units                      c)  $3\pi r^2$  sq.units                      d)  $8\pi r^2$  sq.units
7. The total surface area of a cylinder whose radius is  $\frac{1}{3}$  of its height is
- a)  $\frac{9\pi h^2}{8}$  sq.units                      b)  $24\pi h^2$  sq.units                      c)  $\frac{8\pi h^2}{9}$  sq.units                      d)  $\frac{56\pi h^2}{9}$  sq.units

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

**5 x 2 = 10**

8. Construct a  $3 \times 3$  matrix whose elements are given by  $A = [a_{ij}]$ ,  $a_{ij} = |i - 2j|$
9. If  $A = \begin{pmatrix} 1 & 9 \\ 3 & 4 \\ 8 & -3 \end{pmatrix}$ ,  $B = \begin{pmatrix} 5 & 7 \\ 3 & 3 \\ 1 & 0 \end{pmatrix}$ , then verify that  $A + (-A) = (-A) + A = 0$
10. Find X and Y if  $X + Y = \begin{pmatrix} 7 & 0 \\ 3 & 5 \end{pmatrix}$  and  $X - Y = \begin{pmatrix} 3 & 0 \\ 0 & 4 \end{pmatrix}$
11. 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.

2

X Maths

12. Find the angle of elevation of the top of a tower from a point on the ground, which is 30m away from the foot of a tower of height  $10\sqrt{3}$  m.
13. If the total surface area of a cone of radius 7 cm is  $704 \text{ cm}^2$ , then find its slant height.
14. State Ceva's theorem.

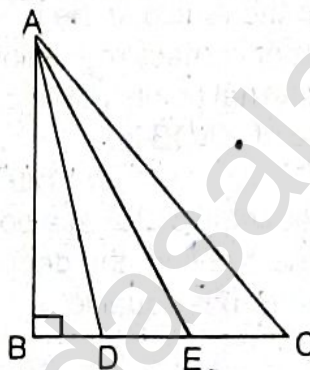
III. Answer any 5 questions. (Q.No.21 is compulsory)

5 x 5 = 25

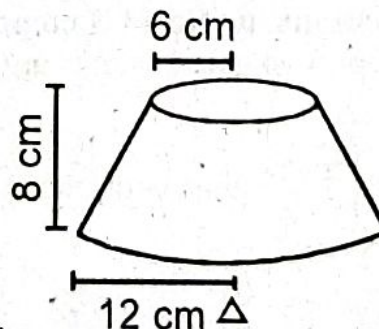
15. Find the value of x,y,z if  $\begin{pmatrix} x-3 & 3x-z \\ x+y+7 & x+y+z \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 1 & 6 \end{pmatrix}$

16. If  $A = \begin{pmatrix} \cos \theta & 0 \\ 0 & \cos \theta \end{pmatrix}$ ,  $B = \begin{pmatrix} \sin \theta & 0 \\ 0 & \sin \theta \end{pmatrix}$ , then show that  $A^2 + B^2 = I$

17. In the adjacent figure, ABC is right angled triangle with right angle at B and points D, E trisect BC. Prove that  $8AE^2 = 3AC^2 + 5AD^2$



18. To a man standing outside his house, the angles of elevation of the top and bottom of a window are  $60^\circ$  and  $45^\circ$  respectively. If the height of the man is 180 cm and if he is 5m away from the wall, what is the height of the window? ( $\sqrt{3} = 1.732$ )
19. A girl wishes to prepare birthday caps in the form of right circular cones for her birthday party, using a sheet of paper whose area is  $5720 \text{ cm}^2$ , how many caps can be made with radius 5 cm and height 12 cm.
20. The frustum shaped outer portion of the table lamp has to be painted including the top part. Find the total cost of painting the lamp if the cost of painting 1 sq.cm is ₹2.



21. State and prove Pythagoras theorem.

IV. Answer any one.

1 x 8 = 8

22. a) Draw the graph of  $y = x^2 + 3x + 2$  and use it to solve  $x^2 + 2x + 1 = 0$

(OR)

- b) Draw the two tangents from a point which is 10 cm away from the centre of the circle of radius 5 cm. Also measure the lengths of the tangents.

\*\*\*\*/\*\*\*\*