Perambalur district
SECOND MIDTERM TEST - 2024
MATHS

STD - X

TIME : 1.30 Hrs

MARKS : 50

I. Choose the correct answer.

8 x 1 = 8

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. If number of columns and rows are not equal in a matrix then it is said to be a
   a) diagonal   b) rectangular matrix   c) square matrix   d) identify matrix

3. In the adjacent figure BAC = 90^0 and AD $\perp$ BC then,
   a) $BD.CD = BC^2$ b) $AB.AC = BC^2$
   c) $BD.CD = AD^2$ d) $AB.AC = AD^2$

4. A tangent is perpendicular to the radius at the
   a) centre   b) point of contact   c) infinity   d) chord

5. The two tangents from an external points P to a circle with centre at O are PA and PB. If $\angle APB = 70^0$ then the value of $\angle AOB$ is
   a) 100^0 b) 110^0 c) 120^0 d) 130^0

6. The electric pole substends an angle 30^0 at a point on the same level as its foot. At angle second point 'b' meters above the first, the depression of the foot of the pole is 60^0. The height of the pole (in meters) is equal to
   a) $\sqrt{3b}$ b) $\frac{b}{3}$ c) $\frac{b}{2}$ d) $\frac{b}{\sqrt{3}}$
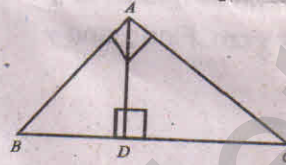
7. The total surface area of a cylinder whose radius is $\frac{1}{3}$ of its height is
   a) $\frac{9\pi h^2}{8}$ sq.units   b) $24\pi h^2$ sq. units   c) $\frac{8\pi h^2}{9}$ sq.units   d) $\frac{56\pi h^2}{9}$ sq.units

8. If two sold hemispheres of same basis 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
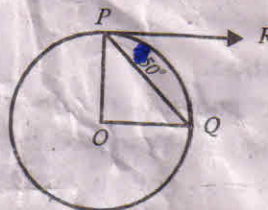
II. Answer any 7 of the following questions. Q.No. 18 compulsory.

7 x 2 = 14

9. $A = \begin{bmatrix} 5 & 4 & -2 \\ 1/2 & 3/4 & \sqrt{2} \\ 1 & 9 & 4 \end{bmatrix}$ $B = \begin{bmatrix} -7 & 4 & -3 \\ 1/4 & 7/2 & 3 \\ 5 & -6 & 9 \end{bmatrix}$ find $4A - 3B$

10. A man goes 18m due east and then 24m due north. Find the distance of his current position from the starting point?

11. In Fig. O is the centre of a circle. PQ is a chord and the tangent PR at P makes an angle of 50^0 with PQ. Find $\angle POQ$.

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12. PQ is a tangent drawn from a point P to a circle with centre O and QOR is a diameter of the circle such that $\angle PQR = 120^0$. Find $\angle OPQ$

13. A kite is flying at a height of 75m above the ground. The string attached to the kite is temporarily tied to a point on the ground. The inclination of the string with the ground is 60^0. Find the length of the string, assuming that there is no slack in the string.

14. To a man standing outside his house, the angles of elevation of the top and bottom of a window are 60^0 and 45^0 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? (tan 38^0 = 0.7813, $\sqrt{3}$ =1.732)

15. In the given figure AB || CD || EF. If AB = 6cm, CD = x cm, EF = 4 cm, BD = 5cm and DE = y cm. Find x and y.
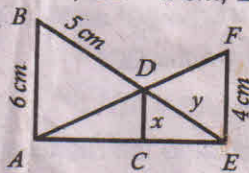
16. The external radius and the length of a hollow wooden log are 16cm and 13 cm respectively. If it thickness is 4cm then find its T.S.A.

17. If $A = \begin{bmatrix} 5 & 2 & 2 \\ -\sqrt{7} & 0.7 & 5/2 \\ 8 & 3 & 1 \end{bmatrix}$ then verify $(A^T)^T = A$

18. A cylindrical drum has a height of 20cm and base radius of 14 cm. Find its curved surface area.

III. Answer any 4 of the following questions. Q.No. 25 compulsory.   4 x 5 = 20

19. If $A = \begin{bmatrix} 1 & 1 \\ -1 & 3 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 2 \\ -4 & 2 \end{bmatrix}$ and $C = \begin{bmatrix} -7 & 6 \\ 3 & 2 \end{bmatrix}$ verify that A(B+C) = AB + AC.

20. State and prove Pythagoras theorem.

21. Show that in a triangle, the medians are concurrent.

22. An aeroplane at an altitude of 1800m find that two boats are sailing towards it in the same direction. The angles of depression of the boats as observed from the aeroplane are 60^0 and 30^0 respectively. Find the distance between the two boats. ($\sqrt{3}$ =1.732)

23. A man watching a boat speeding away from the top of tower. The boat makes an angle of depression of 60^0 with the man's eye when at a distance of 200 m from the tower. After 10 seconds, the angle of depression becomes 45^0. What is the approximate speed of the boat (in km/hr), assuming that is is sailing in water?   ($\sqrt{3}$ =1.732)

24. A persons live in a conical tent whose slant height is 19m. If each person requires 22m² of the floor area, then find the height of the tent.

25. Find X and Y if $X + Y = \begin{bmatrix} 7 & 0 \\ 3 & 5 \end{bmatrix}$ and $X - Y = \begin{bmatrix} 3 & 0 \\ 0 & 4 \end{bmatrix}$

IV. Answer the question.

                                                                                   1 x 8 = 8

26. Draw a circle of diameter 6 cm from a point P, which is 8 cm away from its centre. Draw the two tangents PA and PB to the circle and measure their lengths.   (OR)
Draw the graph $y = x^2 - 4$ of and hence solve $x^2 - x - 12 = 0$.

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