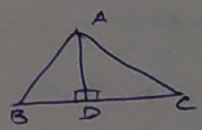
SECOND MID TERM MODEL EXAM - 2024

TIME: 1.30hrs. X STD (MATHEMATICS) MARKS: 50

I. Choose the correct Answer $6 \times 1 = 6$

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) 2×3 (b) 3×2 (c) 3×4 (d) 4×3

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. In the adjacent figure $\angle BAC = 90^\circ$ and $AD \perp BC$ then
(a) $BD \cdot DC = BC^2$ (b) $AB \cdot AC = BC^2$ (c) $BD \cdot CD = AD^2$ (d) $AB \cdot AC = AD^2$

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° (b) 110° (c) 120° (d) 130°

5. A lower is 60m height its shadow is x meters ~~length~~ shorter when the the sun's altitude is 45°. Then when it has been 30°, then x is equal to
(a) 41.92m (b) 43.92m (c) 43m (d) 45.6m

6. Which instrument is used in measuring the angle between an object and the eye of the observer?
(a) microscope (b) theodolite (c) telescope (d) clinometer

II. Answer any 7 questions. (Q.No 16 is compulsory) $7 \times 2 = 14$

7. If $A = \begin{pmatrix} 5 & 4 & -2 \\ \frac{1}{2} & \frac{3}{4} & \sqrt{2} \\ 1 & 9 & 4 \end{pmatrix}$, $B = \begin{pmatrix} 7 & 4 & 3 \\ \frac{1}{4} & \frac{7}{2} & 3 \\ 5 & -6 & 9 \end{pmatrix}$ find $4A - 3B$

8) Find the values of x, y, z if $\begin{bmatrix} x-3 & 3x-z \\ x+y+7 & x+y+z \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 1 & 6 \end{bmatrix}$

9) A Man goes 18m due east and then 24m due north. Find the distance of his current position from the starting point.

10) The length of the tangent to a circle from a point P which is 25cm away from the centre is 24cm. What is the radius of the circle?

11) A player is sitting on the top of a tower of height 20m observes the angle of depression of a ball lying on the ground as 60°. Find the distance between the foot of the tower and the ball ($\sqrt{3} = 1.732$)

12) Find the angle of the 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) A kite ~~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°. Find the length of the string, assuming that there is no slack in the string.

14) If the circumference of a conical wooden piece is 484cm then find its volume when its height is 105cm.

15. The radius and height of cylinder are the ratio 5:7 and its curved surface area is 5500 sq.cm. Find its radius and height.

16) The volume of a solid right circular cone is 11088 cm^3. If its height is 24 cm then find the radius of the cone.

III. Answer any 5 Question. Questions no. 23 is compulsory. $5 \times 5 = 25$

17) Given that $A = \begin{pmatrix} 1 & 3 \\ 5 & -1 \end{pmatrix}$, $B = \begin{pmatrix} 1 & -1 & 2 \\ 3 & 5 & 2 \end{pmatrix}$, $C = \begin{pmatrix} 1 & 3 & 2 \\ -4 & 1 & 3 \end{pmatrix}$ Verify that $A(B+C) = AB+AC$.

18) $A = \begin{bmatrix} 1 & 1 \\ -1 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 \\ -4 & 2 \end{bmatrix}$, $C = \begin{bmatrix} 1 & 1 \\ -1 & 3 \end{bmatrix}$ $C = \begin{bmatrix} -7 & 6 \\ 3 & 2 \end{bmatrix}$ Verify that $A(B+C) = AB+AC$.

19) State and Prove the Pythagoras Theorem.

20) An aeroplane at an altitude of 1800 m finds 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° and 30° respectively. Find the distance between the boats. ($\sqrt{3} = 1.732$)

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

22) A right circular cylindrical container of base radius 6 cm and height 15 cm full of ice cream. The ice cream is to be filled in cones of height 9 cm and base radius 3 cm, having a hemisphere cap. Find the number of cones needed to empty the container.

23) Two ships are sailing in the sea on either sides of a light house. The angle of elevation of the top of the light house as observed from the ships are 30° and 45° respectively. If the light house is 200 m height. find the distance between the two ships ($\sqrt{3} = 1.732$).

IV. Answer the following. $2 \times 5 = 10$

24. (a) Draw a circle of diameter 6 cm from a point P. which is 8 cm. away from its centre Draw two tangents PA and PB to the circle and measure their lengths. (OR)

(b) Draw a circle of radius 4.5 cm. Take a point on the circle. Draw the tangent at the point using the alternate segment theorem.

25. (a) Graph the quadratic equation $x^2+2x+5=0$ and state the nature of their solution (OR)

(b) Draw the graph of $y = x^2 - 5x - 6$ and $x^2 - 5x - 14 = 0$

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