




SECOND MID TERM TEST - 2024

13/11/24

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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 2x3 matrix and B is a 3x4 matrix, how many columns does AB have
a) 3 b) 4 c) 2 d) 5
2. Transpose of a column matrix is
a) unit matrix b) diagonal matrix
c) column matrix d) row matrix
3. How many tangents can be drawn to the circle from an exterior point?
a) one b) infinite c) two d) zero
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) 110° b) 100° c) 120° d) 130°
5. 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° b) 30° c) 90° d) 60°
6. 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
7. The total surface area of a hemi-sphere is how much times the square of its radius?
a) π b) 4π c) 3π d) 2π

Part - II

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

5 x 2 = 10

8. In the matrix $A = \begin{bmatrix} 8 & 9 & 4 & 3 \\ -1 & \sqrt{7} & \frac{\sqrt{3}}{2} & 5 \\ 1 & 4 & 3 & 0 \\ 6 & 8 & -11 & 1 \end{bmatrix}$,

write

- i) The number of elements ii) The order of the matrix
iii) Write the elements $a_{22}, a_{23}, a_{24}, a_{34}, a_{43}, a_{44}$.

9. If $A = \begin{bmatrix} \sqrt{7} & -3 \\ -\sqrt{5} & 2 \\ \sqrt{3} & -5 \end{bmatrix}$, then find the transpose of $-A$.

10. If $A = \begin{bmatrix} 2 & 5 \\ 4 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 1 & -3 \\ 2 & 5 \end{bmatrix}$, find AB , BA and verify $AB = BA$?
11. A kite is flying at a height of 75 m 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.
12. From the top of a rock $50\sqrt{3}$ m high, the angle of depression of a car on the ground is observed to be 30° . Find the distance of the car from the rock.
13. The curved surface area of a right circular cylinder of height 14 cm is 88 cm^2 . Find the diameter of the cylinder.
14. Find the length of the tangent drawn from a point whose distance from the centre of a circle is 5 cm and radius of the circle is 3 cm.

Part - III

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

5 X 5 = 25

15. If $A = \begin{bmatrix} 1 & 1 \\ -1 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 \\ -4 & 2 \end{bmatrix}$, $C = \begin{bmatrix} -7 & 6 \\ 3 & 2 \end{bmatrix}$, verify that $A(B + C) = AB + AC$.
16. If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, show that $A^2 - (a+d)A = (bc - ad)I_2$
17. State and Prove Pythagoras Theorem.
18. P and Q are the mid-points of the sides CA and CB respectively of a $\triangle ABC$, right angled at C. Prove that $4(AQ^2 + BP^2) = 5AB^2$
19. 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° and 45° respectively. If the lighthouse is 200 m high, find the distance between the two ships. ($\sqrt{3} = 1.732$)
20. A container open at the top is in the form of a frustum of a cone of height 16 cm with radii of its lower and upper ends are 8 cm and 20 cm respectively. Find the cost of milk which can completely fill a container at the rate of ₹40 per litre.

21. If $A = \begin{bmatrix} 5 & 2 & 9 \\ 1 & 2 & 8 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 7 \\ 1 & 2 \\ 5 & -1 \end{bmatrix}$, verify that $(AB)^T = B^T A^T$

Part - IV

IV. Answer any one.

1 x 8 = 8

22. a) Draw the graph of $y = x^2 + 3x - 4$ and hence use it to solve $x^2 + 3x - 4 = 0$

(OR)

- b) 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.
