

SALEM DISTRICT

2MS

SECOND MID TERM TEST - 2022

CLASS : 10

MATHEMATICS

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MARKS : 50

TIME : 1.30

I Choose the correct answer.

4 × 1 = 4

- The two tangents from an external point 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°
- 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°
- The height of a right circular cone whose radius is 5cm and slant height is 13cm will be
a) 12cm b) 10cm c) 13 cm d) 5 cm
- If $A = \begin{pmatrix} \sin \theta & \cos \theta \\ -\cos \theta & \sin \theta \end{pmatrix}$, and $B = \begin{pmatrix} \sin \theta & -\cos \theta \\ \cos \theta & \sin \theta \end{pmatrix}$ then $AB =$
a) $\begin{pmatrix} \sin^2 \theta & 0 \\ 0 & \cos^2 \theta \end{pmatrix}$ b) $\begin{pmatrix} \cos^2 \theta & 0 \\ 0 & \sin^2 \theta \end{pmatrix}$ c) $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$ d) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$

II Answer any 5 of the following questions. Question number 12 is compulsory.

- If $A = \begin{bmatrix} \sqrt{7} & -3 \\ -\sqrt{5} & 2 \\ \sqrt{3} & -5 \end{bmatrix}$ then find the transpose of $-A$. 5 × 2 = 10

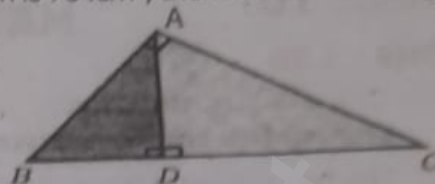
- Verify that $A^2 = I$ when $A = \begin{bmatrix} 5 & -4 \\ 6 & -5 \end{bmatrix}$.

- If radii of two concentric circles are 4 cm and 5 cm then find the length of the chord of one circle which is a tangent to the other circle.
- 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.
- From the top of a rock $50\sqrt{3}$ high, the angle of depression of a car on the ground observed to be 30° . Find the distance of the car from the rock.

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10. Find the diameter of a sphere whose surface area is 154m^2 .
 11. If the total surface area of a cone of radius 7 cm is 704cm^2 , then find its slant height.
 12. In the given figure $\angle A = 90^\circ$, $BD = 4\text{ cm}$,

$DC = 9\text{cm}$ and $AD \perp BC$, then
 find the length of AD .



III Answer any 4 of the following questions.

$5 \times 4 = 20$

Question number 19 is compulsory.

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

14. If $A = \begin{bmatrix} 1 & 2 & 1 \\ 2 & -1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -1 \\ -1 & 4 \\ 0 & 2 \end{bmatrix}$ show that $(AB)^T = B^T A^T$.

15. State and prove Pythagoras Theorem.
 16. From the top of a lighthouse, the angle of depression of two ships on the opposite sides of it are observed to be 30° and 60° . If the height of the lighthouse is h meters and the line joining the ships passes through the foot of the lighthouse, show that the distance between the ship is $\frac{4h}{\sqrt{3}}$ m.
 17. From the top of 12m high building, but angle of elevation of the top of a cable tower is 60° and the angle of depression of its foot is 30° . Determine the height of the tower.
 18. A container open at the top is in form of a frustum of a cone of height 16cm with radii of its lower and upper ends are 8cm and 20 cm respectively. Find the cost of milk which can completely fill a container at the rate of $\text{Rs.}40$ per litre.
 19. Two circles with centres O and O' of radii 3cm and 4 cm , respectively intersects at two points P and Q , such that OP and $O'P$ are tangents to the two circles. Find the length of the common chord PQ .

IV Answer the following 2 questions.

$2 \times 8 = 16$

20. a) Draw Circle of radius 4 cm . At a point L on it draw a tangent to the circle using the alternate segment. **(OR)**
 b) Draw the tangents from a point which is 10cm away from the centre of a circle of radius 5 cm . Also measure the lengths of the tangents.
 21. a) Discuss the nature of solutions of the quadratic equation $x^2 - 8x + 16 = 0$. **(OR)** b) Draw the graph of $y = x^2 + 3x - 4$ and hence use it to solve $x^2 + 3x - 4 = 0$.