V10M

**Virudhunagar District**
Common Second Mid Term Test - 2024

**Standard 10**

Time: 1.30 Hrs.        **MATHS**        Marks: 50

**I. Choose the best answer:**          7×1=7

1) 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

2) If A is a 2×8 matrix, how many elements in a matrix A
   a) 16      b) 2      c) 10      d) 8

3) How many tangents can be drawn to the circle from an exterior point?
   a) one      b) two      c) infinite      d) zero

4) 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) 45º      b) 30º      c) 90º      d) 60º

5) If the radius of the base of a cone is tripled and the height is doubled then the volume is
   a) made 6 times          b) made 18 times
   c) made 12 times          d) unchanged

6) 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

7) Which of the following are not the sides of a right triangle?
   a) 3, 4, 5      b) 13, 12, 5      c) 25, 7, 24      d) 4, 7, 8

**II. Answer any five questions: (Q.No. 14 is compulsory)**      5×2=10

8) Construct a 3×3 matrix whose elements are $a_{ij} = i^2 j^2$.

9) If $A = \begin{pmatrix} 0 & 4 & 9 \\ 8 & 3 & 7 \end{pmatrix}$, $B = \begin{pmatrix} 7 & 3 & 8 \\ 1 & 4 & 9 \end{pmatrix}$ find the value of 3A–9B.

10) 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.

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

12) A ladder 18 metres long just reaches the top of a vertical wall. If the ladder makes an angle of 60º, with the wall find the height of the wall.

13) If the total surface area of a cone of radius 7 cm is 704 cm², then find its slant height.

14) If the ratio of radii of two spheres is 4:7, find the ratio of their volumes.

## III. Answer any five questions: (Q.No. 21 is compulsory)     5×5=25

15) 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 $(AB)^T = B^T A^T$.

16) State and prove - Pythagoras theorem.

17) 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 200m high, find the distance between the two ships. $\left( \sqrt{3} = 1.732 \right)$

18) The angle of elevation and depression of the top and bottom of a lamp post from the top of a 66m high apartment are 60° and 30° respectively. Find
   i)   The height of the lamp post.
   ii)  The difference between height of the lamp post and the apartment.
   iii) The distance between the lamp post and the apartment. $\left( \sqrt{3} = 1.732 \right)$

19) If the radii of the circular ends of a frustum which is 45 cm high are 28 cm and 7 cm, find the volume of the frustum.

20) 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 cm², how many caps can be made with radius 5 cm and height 12 cm.

21) If $A = \begin{pmatrix} 3 & 2 \\ -2 & 2 \end{pmatrix}$ show that $A^2 - 5A + 10I_2 = 0$.

## IV. Answer the following:        1×8=8

22) Draw the two tangents from a point which is 5 cm away from the centre of a circle of diameter 6 cm. Also measure the lengths of the tangents.

### (OR)

Discuss the nature of the solutions of the following quadratic equations:
$x^2 + x - 12 = 0$

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