SECOND MID TERM TEST - 2023

10 - Std   MATHS
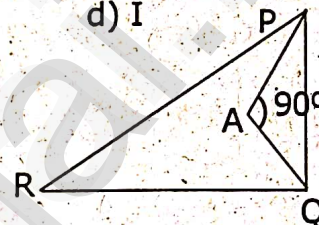
Time: 1.30 Hrs.   Marks: 50

Note: i) Answer all the questions.   7×1=7

1) If A is a 2×3 matrix and B is a 3×4 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) The non-diagonal elements in any unit matrix are
   a) 0   b) 1   c) aij   d) I

4) In the given figure PR = 26 cm,
   QR = 24 cm, ∠PAQ = 90º, PA = 6 cm
   and QA = 8 cm. Find ∠PQR.

   a) 80º   b) 85º   c) 75º   d) 90º

5. The angle of Elevation of cloud from a point h metres above a lake is β. The angle of depression of its reflection in the lake is 45° The height of location of the cloud from the lake is

   a) $\dfrac{h(1+\tan\beta)}{1-\tan\beta}$ b) $\dfrac{h(1-\tan\beta)}{1+\tan\beta}$ c) $h\tan\left(45°-\beta\right)$ d) None of these

6. The curved surface area of a right circular cone of height 15 cm and base diameter 16 cm is   a) 60π cm²   b) 68π cm²   c) 120π cm²   d) 136π cm²

7. The total surface area of cyclinder whose radius is $\dfrac{1}{3}$ of its height is

   a) $\dfrac{9\pi h^2}{8}$ sq.units.   b) $24\pi h^2$ sq. units. c) $\dfrac{8\pi h^2}{9}$ sq. units. d) $\dfrac{56\pi h^2}{9}$ sq. units.

Part - II

Note: Answer any 5 questions.   Question No. 14 is compulsory.   5×2=10

8) Find the value of a, b, c, d from the equation $\begin{pmatrix} a-b & 2a+c \\ 2a-b & 3c+d \end{pmatrix} = \begin{pmatrix} 1 & 5 \\ 0 & 2 \end{pmatrix}$.

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

10) Find the length of the tangent dracon from a point whose distance from the centre of a circle is 5 cm and radius of the circle is 3 cm.

11) State Ceva's theorem.

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12) In figure, ΔABC is circumscribing a circle. Find the length of BC.
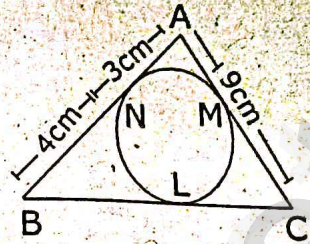
13) From the top of a rock $50\sqrt{3}$ m high, the angle of depression of a car on the ground is observed to be 30°. Find the distance of the car from the rock.

14) 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 $3A - 9B$.

Part - C

II. **Answer any 5 of the following questions: Q.No.21 Compulsory . 5 x 5 = 25**

15. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ and $A^2 - 5A + 7I_2 = 0$.

16. 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).

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17. State and prove Baudhayana theorem.

18. 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

19. The angle of elevation of the top of a cell phone tower from the foot of a high apartment is 60° and the angle of depression of the foot of the tower from the top of the apartment is 30° If the height of the apartment is 50 m, find the height of the cell phone tower. According to radiations control norms, the minimum height of a cell phone tower should be 120 m. state If the height of the above mentioned cell phone tower meets the radiation norms. (tan40° = 0.8391, $\sqrt{3}$ = 1.732)

20. An Industrial metallic bucket is in the shape of the frustram of a right circular cone whose top and bottom diameters are 10m and 4m and whose height is ccc4m. Find the curved and total surface area of the bucket.

21. 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 ships is $\dfrac{4h}{\sqrt{3}}$ m.

Part - IV
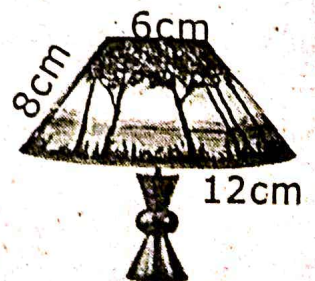
Note : Answer the following question.

22) a) Discuss the nature of solutions of the quadratic equation $x^2 + x - 12 = 0$. **(OR)**
b) Take a point which is 11 cm away from the centre of a circle of radius 4 cm and draw the two tangents to the circle from that point.

1×8=8

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