

A

SECOND MID-TERM TEST - 2022**Standard - X****Time : 1.30 hrs****MATHS****Marks: 50****7×1=7****I. Choose the correct answer:-**

1) For the given matrix $A = \begin{pmatrix} 1 & 3 & 5 & 7 \\ 2 & 4 & 6 & 8 \\ 9 & 11 & 13 & 15 \end{pmatrix}$ 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) 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°

4) A tower is 60m high. Its shadow is x metres shorter when the sun's altitude is 45° than when it has been 30° then x is equal to

- a) 41.92m b) 43.92m c) 43m d) 45.6m

5) The angle of depression of the top and bottom of 20m tall building from the top of a multistoried building are 30° and 60° respectively. The height of the multistoried building and the distance between two buildings (in metres) is

- a) 20, $10\sqrt{3}$ b) 30, $5\sqrt{3}$ c) 20, 10 d) 30, $10\sqrt{3}$

6) The curved surface area of a right circular cone of height 15cm and base diameter 16cm is

- a) $60\pi\text{cm}^2$ b) $68\pi\text{cm}^2$ c) $120\pi\text{cm}^2$ d) $136\pi\text{cm}^2$

7) The height of a right circular cone whose radius is 5cm and slant height is 13cm will be

- a) 12cm b) 10cm c) 13cm d) 5cm

II. Answer any five questions. Question no.14 is compulsory:**5×2=10**

8) If $A = \begin{pmatrix} 5 & 4 & 3 \\ 1 & -7 & 9 \\ 3 & 8 & 2 \end{pmatrix}$ then find the transpose of A .

9) If $A = \begin{pmatrix} 0 & 4 & 9 \\ 8 & 3 & 7 \end{pmatrix}$ $B = \begin{pmatrix} 7 & 3 & 8 \\ 1 & 4 & 9 \end{pmatrix}$ then find the value of $B-5A$

10) Define Ceva's theorem.

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- 11) A tower stands vertically on the ground. From a point on the ground which is 48m away from the foot of the tower the angle of elevation of the top of the tower is 30° . Find the height of the tower.
- 12) The radius and height of a cylinder are in the ratio 5:7 and its curved surface area is 5500 sq.cm. Find its radius and height.
- 13) A cylindrical drum has a height of 20cm and base radius of 14cm. Find its total surface area.
- 14) If $A = \begin{pmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{pmatrix}$ prove that $AA^T = I$

III. Answer any five questions. Question no.21 is compulsory:-

5×5=25

- 15) If $A = \begin{pmatrix} 5 & 2 & 9 \\ 1 & 2 & 8 \end{pmatrix}$ $B = \begin{pmatrix} 1 & 7 \\ 5 & -1 \end{pmatrix}$ verify that $(AB)^T = B^T A^T$
- 16) If $A = \begin{pmatrix} 4 & 3 & 1 \\ 2 & 3 & -8 \\ 1 & 0 & -4 \end{pmatrix}$ $B = \begin{pmatrix} 2 & 3 & 4 \\ 1 & 9 & 2 \\ -7 & 1 & -1 \end{pmatrix}$ $C = \begin{pmatrix} 8 & 3 & 4 \\ 1 & -2 & 3 \\ 2 & 4 & -1 \end{pmatrix}$ then verify that $A+(B+C)=(A+B)+C$
- 17) Show that in a triangle the medians are concurrent.
- 18) Two ships are sailing in the sea on either sides of a lighthouse. The angle of elevation of the top of the lighthouse is observed from the ships are 30° and 45° respectively. If the lighthouse is 200m high. Find the distance between the two ships.
- 19) An industrial metallic bucket is in the shape of the frustum of a right circular cone whose top and bottom diameters are 10m and 4m and whose height is 4m find the curved and total surface area of the bucket.
- 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 5720cm^2 how many caps can be made with radius 5cm and height 12cm.
- 21) If $A = \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$ show that $A^2 - 5A + 7I_2 = 0$

IV. Answer any one question:

8×1=8

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

[or]

Discuss the nature of solution for the quadratic equation $x^2 - 8x + 16 = 0$.
