

SECOND MIDTERM TEST – NOVEMBER 2022

X - Std

Mathematics

Time: 1.30 Hrs.

Maximum Marks - 50

PART - I (Marks - 7)

Note: Answer ALL questions: -

7 x 1 = 7

1. If A is a 2×3 matrix and B is a 3×4 matrix, how many columns does AB have

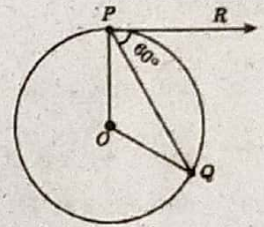
(A) 3 (B) 4 (C) 2 (D) 5

2. If $A = \begin{pmatrix} 4 & -2 \\ 6 & -3 \end{pmatrix}$, then $A^2 =$

(A) $\begin{pmatrix} 16 & 4 \\ 36 & 9 \end{pmatrix}$ (B) $\begin{pmatrix} 8 & -4 \\ -12 & -6 \end{pmatrix}$ (C) $\begin{pmatrix} -4 & 2 \\ -6 & 3 \end{pmatrix}$ (D) $\begin{pmatrix} 4 & -2 \\ 6 & -3 \end{pmatrix}$

3. In figure if PR is tangent to the circle at P and O is the centre of the circle, then $\angle POQ$ is

(A) 120° (B) 100° (C) 110° (D) 90°



4. A vertical stick 12 m long casts a shadow 8m long on the ground and a same time a tower casts a shadow 40 m long on the ground, then the height of the tower is

(A) 41.92 m (B) 43.92 m (C) 43 m (D) 45.6 m

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 base area and height of the hemisphere and the cone are equal. Then the ratio of its curved surface area is

(A) $1 : 2$ (B) $2 : 1$ (C) $1 : \sqrt{2}$ (D) $\sqrt{2} : 1$

7. 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

PART - II (Marks - 10)

Note: Answer any FIVE questions. Question Number 14 is compulsory: -

5 x 2 = 10

8. If $A = \begin{pmatrix} 5 & 2 & 2 \\ -\sqrt{17} & 0.7 & \frac{5}{2} \\ 8 & 3 & 1 \end{pmatrix}$ then, find $(A^T)^T$

9. If $A = \begin{pmatrix} \cos^2 \theta & 0 \\ 0 & \cos^2 \theta \end{pmatrix}$ and $B = \begin{pmatrix} \sin^2 \theta & 0 \\ 0 & \sin^2 \theta \end{pmatrix}$ then, show that $A + B = I_2$

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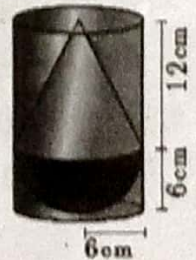
10. State Ceva's theorem.
11. From the top of a building 12 m high, the angle of depression of a car on the ground is observed to be 30° . Find the distance of the car from the building.
12. A kite is flying at a height of 75 m above the ground. The string attached to the kite is temporarily tied to 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.
13. A garden roller whose length is 3 m long and whose diameter is 2.8 m is rolled to level a garden. How much area will it cover in 8 revolutions?
14. If the ratio of radii of two spheres is 4 : 7, find the ratio of their volumes.

PART - III (Marks - 25)

Note: Answer any FIVE questions. Question Number. 21 is compulsory: -

5 x 5 = 25

15. If $A = \begin{pmatrix} 1 & 1 \\ -1 & 3 \end{pmatrix}$, $B = \begin{pmatrix} 1 & 2 \\ -4 & 2 \end{pmatrix}$ and $C = \begin{pmatrix} -7 & 6 \\ 3 & 2 \end{pmatrix}$, verify that $A(B+C) = AB+AC$
16. State and prove Pythagoras theorem
17. From the top of a tree of height 13 m the angle of elevation and depression of the top and bottom of another tree are 45° and 30° respectively. Find the height of the second tree. ($\sqrt{3} = 1.732$)
17. 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 $\frac{4h}{\sqrt{3}}$ m.
18. 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.
19. A solid consisting of a right circular cone of height 12 cm and radius 6 cm standing on a hemisphere of radius 6 cm is placed upright in a right circular cylinder full of water such that it touches the bottom. Find the volume of the water displaced out of the cylinder, if the radius of the cylinder is 6 cm and height is 18 cm.
20. If $A = \begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$ then show that $A^2 - 5A + 7I_2 = 0$



PART - IV (Marks- 8)

Note: Answer any one question: -

1 x 8 = 8

21. (A). 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

OR

- (B). Draw the graph of $y = x^2 - 4x + 3$ and use it to solve $x^2 - 6x + 9 = 0$

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