Class:10

Register Number

SECOND MID TERM TEST-NOVEMBER-2023

Time Allowed : 1.30 Hours]

MATHEMATICS

[Max. Marks : 50

PART - A

I.   Choose the correct Answer.   7x1=7

1.   If A is a 2x3 matrix and B is a 3x4 matrix, how many columns does AB have

   (a) 3   (b) 4   (c) 2   (d) 5

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.   A tangent is perpendicular to the radius at the

   (a) Centre   (b) Point of contact (c) Infinity   (d) Chord

4.   If the ratio of the height of a tower and the length of its shadow is √3:1, then the angle of elevation of the Sun has measure

   (a) 45°   (b) 30°   (c) 90°   (d) 60°

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

   (a) 60 π cm²   (b) 68 π cm²   (c) 120 π cm²   (d) 136 π cm²

6.   The total surface area of a hemi-sphere is how much times the square of its radius

   (a) π   (b) 4π   (c) 3π   (d) 2π

7.   The ratio of the volumes of a cylinder, a cone and a sphere, if each has the same diameter and same height is

   (a) 1:2:3   (2) 2:1:3   (c) 1:3:2   (d) 3:1:2

PART - B

II.   Answer any five questions only. [Q.No. 14 is compulsory].   5x2=10

8.   Construct a 3x3 matrix whose elements are given by $a_{ij}=| i-2j |$.

9.   Show that the matrices $A = \begin{pmatrix} 1 & 2 \\ 3 & 1 \end{pmatrix}$, $B = \begin{pmatrix} 1 & -2 \\ -3 & 1 \end{pmatrix}$ satisfy commutative property AB = BA

10.   Find the angle of elevation of the top of a tower from a point on the ground, which is 30m away from the foot of a tower of height $10\sqrt{3}$ m.

11.   The curved surface area of a right circular cylinder of height 14 cm is 88 cm². Find the diameter of the cylinder.

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12. If the circumference of a conical wooden piece is 484 cm, then find its volume when its height is 105 cm.

13. Find the length of the tangent drawn from a point whose distance from the centre of a circle is 5 cm and radius of the circle is 3 cm.

14. If the ratio of radii of two spheres is 4:7. Find the ratio of their volumes.

PART - C

III. Answer any 5. Q.No. 21 is compulsory.   5x5=25

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

16. State and prove Pythagoras theorem.

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 metres and the line joining the ships passes through the foot of the lighthouse, show that the distance between the ships is $4h/\sqrt{3}$ 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 sphere of radius 6 cm is melted into a hollow cylinder of uniform thickness. If the external radius of the base of the cylinder is 5 cm and its height is 32 cm, then find the thickness of the cylinder.

20. From the top of a tree of height 13m, 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).

21. Find x and y if,

$$X+Y = \begin{pmatrix} 7 & 0 \\ 3 & 5 \end{pmatrix}$$

$$X-Y = \begin{pmatrix} 3 & 0 \\ 0 & 4 \end{pmatrix}$$

PART - D

IV. Answer Any One of the following.   1x8=8

22. 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.

23. Draw the graph of $y = x^2+3x-4$ and hence use it to solve $x^2+3x-4=0$

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