V10M

Virudhunagar District Common Examinations
Common Second Mid Term Test - November 2022

Standard 10
MATHS

Time: 1.30 Hrs. Marks: 50

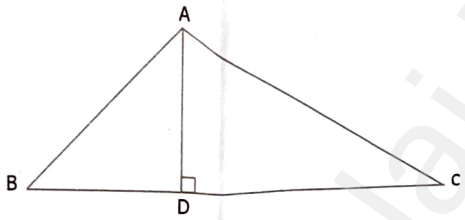
PART - A

I. Choose the best option: 7×1=7

1) Transpose of a row matrix is
   a) Diagonal matrix b) Unit matrix
   c) Row matrix d) Column matrix

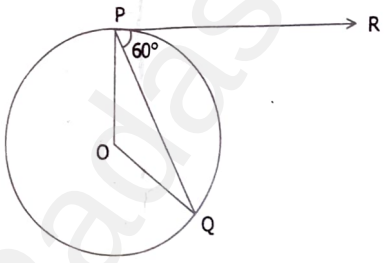
2) If A is a 3×4 matrix and B is a 4×5 matrix, how many columns does AB have
   a) 2 b) 3 c) 4 d) 5

3) In the adjacent figure $\angle BAC = 90^o$ and $AD \perp BC$ then



   a) $BD.DC = BC^2$ b) $AB.AC = BC^2$ c) $BD.DC = AD^2$ d) $AB.AC = AD^2$

4) In the figure is PR is a tangent to the circle at P, and 'O' is the centre of the circle, then $\angle POQ$ is



   a) 120^o b) 100^o c) 110^o d) 90^o

5) If the ratio of the height of a tower and the length of its shadow is $1 : \sqrt{3}$, then the angle of elevation of the sun is
   a) 30^o b) 45^o c) 60^o d) 90^o

6) The total surface area of a cylinder whose radius is $\frac{1}{3}$ of its height is
   a) $\frac{9}{8}\pi h^2$ sq.units b) 24π sq.units
   c) $\frac{8}{9}\pi h^2$ sq.units d) $\frac{56}{9}\pi h^2$ sq.units

7) A spherical ball of radius r_1 units is melted to make 8 new identical balls each of radius r_2 units, then $r_1 : r_2$ is
   a) 1:2 b) 2:1 c) 1:8 d) 8:1

PART - B

Answer any 5 questions only. Qn.No. 14 is compulsory: 5×2=10

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

9) What length of ladder is needed to reach a height of 7 ft along the wall when the base of the ladder is 4 ft from the wall.

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10) The angle of elevation of the top of a tower 48m away from the foot of the tower is 30°. Find the height of the tower.

11) The horizontal distance between two buildings in 70m. The angle of depression of the top of the first building when seen from the top of the second building is 45°. If the height of the second building is 120m. Find the height of the first building.

12) The curved surface area of a right circular cylinder of height 14 cm is 88 cm^2. Find the diameter of the cylinder.

13) 4 persons live in a conical tent whose slant height is 19m. If each person require 22m^2 of the floor area, then find the height of the tent.

14) Verify that $A^2 = I$ when $A = \begin{pmatrix} 5 & -4 \\ 6 & -5 \end{pmatrix}$.

PART - C

Answer any 5 questions only. [Qn.No. 21 is compulsory]: **5×5=25**

15) Find X and Y if $X + Y = \begin{pmatrix} 7 & 0 \\ 3 & 5 \end{pmatrix}$ and $X - Y = \begin{pmatrix} 3 & 0 \\ 0 & 4 \end{pmatrix}$.

16) If $A = \begin{pmatrix} 1 & 2 & 1 \\ 2 & -1 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & -1 \\ -1 & 4 \\ 0 & 2 \end{pmatrix}$ show that $(AB)^T = B^T A^T$.

17) State and Prove Pythagoras Theorem.

18) To a man standing outside his house, the angle of elevation of the top and bottom of a window are 60° and 40° respectively. If the height of the man is 1.8m and if he is 5m away from the wall, what is the height of the window?

19) From the top of a 12m high building, the angle of elevation of the top of a cable tower is 30° and the angle of depression of its foot is 30°. Determine the height of the tower.

20) From a solid cylinder whose height is 2.4 cm and diameter 1.4 cm, a conical cavity of the same height and base is hollowed out. Find the total surface area of the remaining solid.

21) 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.

PART - D

IV. Answer any one question only: **1×8=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.

(OR)

Discuss the nature of solutions of the quadratic equation $x^2-8x+16=0$ using graph.

X - MATHS

1) (d) இரண்டு

2) (d) 5

3) (c) $BD \cdot DC = AD^2$

4) (a) 120°

5) (a) 30°

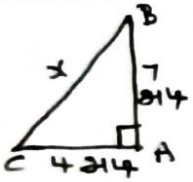
6) (c) $\frac{8}{9}\pi h^2$ ச.அ.

7) (b) 2 : 1

2 MARKS

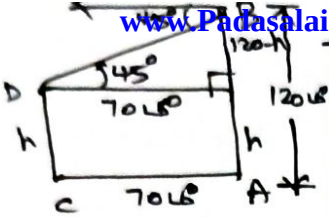
8) $A = \begin{pmatrix} 1 & 3 \\ 0 & 2 \\ 1 & 1 \end{pmatrix}_{3\times 2}$

9) $x = \sqrt{4^2+7^2}$
$= \sqrt{16+49}$
$= \sqrt{65}$
$x = 8.1$ செ.மீ



10) $\tan 30° = \frac{h}{48}$
$\frac{1}{\sqrt{3}} = \frac{h}{48}$
$h = \frac{48}{\sqrt{3}} = 16\sqrt{3}$
$h = 27.712$ மீ

11)



$\tan 45° = \frac{120-h}{70}$
$h = 120 - 70$
$h = 50$ மீ

12) $2\pi rh = 88$
$2 \times \frac{22}{7} \times r \times 14 = 88$
$r = 1$
∴ விட்டம் $= 2(1) = 2$ அ.மீ

13) ~~$\pi r^2 - \pi \times 22$~~
$\pi r^2 = 4 \times 22 = 88$
$r^2 = 28$
∴ $h = \sqrt{l^2 - r^2}$
$= \sqrt{19^2 - 28}$
$= \sqrt{333}$
$h = 18.25$ மீ

14) $A^2 = \begin{pmatrix} 25-24 & -20+20 \\ 30-30 & -24+25 \end{pmatrix}$
$A^2 = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} = I$

15) $X = \begin{pmatrix} 5 & 0 \\ \frac{3}{2} & \frac{9}{2} \end{pmatrix}$

$Y = \begin{pmatrix} 2 & 0 \\ \frac{3}{2} & \frac{1}{2} \end{pmatrix}$

16) $AB = \begin{pmatrix} 0 & 9 \\ 5 & -4 \end{pmatrix}$

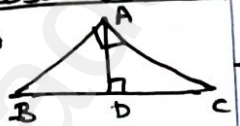
$(AB)^T = \begin{pmatrix} 0 & 5 \\ 9 & -4 \end{pmatrix}$

$B^T = \begin{pmatrix} 2 & -1 & 0 \\ -1 & 4 & 2 \end{pmatrix}$

$A^T = \begin{pmatrix} 1 & 2 \\ 2 & -1 \\ 1 & 1 \end{pmatrix}$

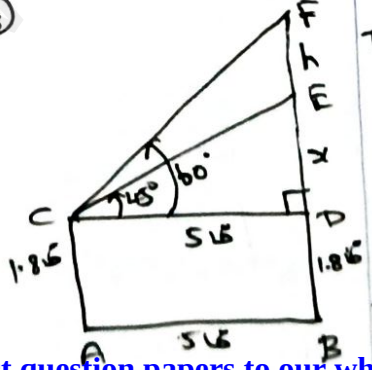
17) நிரூபணம்

$\Delta ABC \sim \Delta DBA$
$\Delta ABC \sim \Delta DAC$



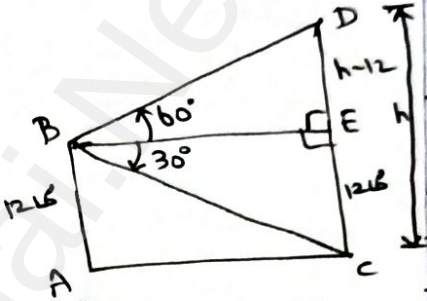
$AB^2 = BC \times BD \rightarrow (1)$
$AC^2 = BC \times DC \rightarrow (2)$
∴ $AB^2 + AC^2 = BC^2$

18)



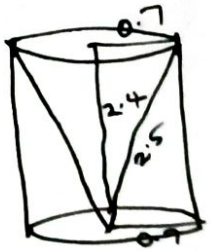
$\tan 45° = \frac{x}{5}$
$x = 5$
ΔCDE ல், $\tan 60° = \frac{x+h}{5}$
$5\sqrt{3} = 5 + h$
$h = 5(\sqrt{3}-1) = 3.66$ மீ

19)



ΔBCE ல், $\tan 30° = \frac{12}{x}$
$\frac{1}{\sqrt{3}} = \frac{12}{x}$
$x = 12\sqrt{3}$
ΔBED ல், $\tan 60° = \frac{h-12}{x}$
$\sqrt{3} = \frac{h-12}{12\sqrt{3}} \Rightarrow h = 48$ மீ

20)



$r = \frac{1.4}{2} = 0.7$
$= \frac{7}{10}$ cm
$h = 2.4 = \frac{24}{10}$ cm

$TSA = 2\pi rh + \pi r^2 + \pi rl$
$= \pi r[2h + r + l]$
$= \frac{22}{7} \times \frac{7}{10}\left[2 \times \frac{24}{10} + \frac{7}{10} + 2.5\right]$
$= 2.2[8]$
$= 17.6$ ச.அ.மீ

21) $\frac{4}{3}\pi \times b \times b \times b = \pi \times 3^2 \times (5^2 - r^2)$
$r^2 = 16$
$r = 4$ அ.மீ
∴ மீதம் $= R - r = 5 - 4 = 1$ அ.மீ

22) $PA = \sqrt{8^2 - 3^2} = \sqrt{55}$
$PA = 7.4$ அ.மீ

23) $y = 1x^2 - 8x + 16$

x	-1	0	1	2	3	4	5	6	7
y	25	16	9	4	1	0	1	4	9

வரைபடம் வரைதல்