

22103

24225

3 Hours / 70 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Assume suitable data, if necessary.
 - (4) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following :

10

- (a) Evaluate $\log_5 625$.
- (b) Find the area of triangle whose vertices are (3, 1) (-1, 3) and (-3, -2).
- (c) Without using calculator find the value of $\sin (15^\circ)$.
- (d) Find the area of rhombus whose diagonals have lengths 40 cm and 70 cm.
- (e) A cone has a circular base of radius 10 cm and slant height of 30 cm.
Calculate the surface area.
- (f) Find range and coefficient of the range of the data :
50, 90, 120, 40, 180, 200, 80.
- (g) If the coefficient of variation of a distribution is 75% and standard deviation is 24. Find its mean.



2. Attempt any THREE of the following :

12

(a) If $A = \begin{bmatrix} 2 & 5 & 6 \\ 0 & 1 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 6 & 1 \\ 0 & 4 \\ 5 & 7 \end{bmatrix}$, verify that $(AB)^T = B^T \cdot A^T$.

(b) Using Cramer's rule solve $x - y - 2z = 1$, $2x + 3y + 4z = 4$, $3x - 2y - 6z = 5$.

(c) Resolve into partial fractions $\frac{x-5}{x(x+3)(x-2)}$.

(d) Find mean of the following data :

Class interval	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Frequency	3	5	8	3	1

3. Attempt any THREE of the following :

12

(a) If $A + B = \frac{\pi}{4}$, then show that $(1 + \tan A)(1 + \tan B) = 2$.

(b) Prove that $\frac{\cos 3A + 2\cos 5A + \cos 7A}{\cos A + 2\cos 3A + \cos 5A} = \cos 2A - \tan 3A \cdot \sin 2A$.

(c) If $\cos A = 0.4$, find $\cos (3A)$.

(d) Prove that $\tan^{-1}\left(\frac{1}{7}\right) + \tan^{-1}\left(\frac{1}{13}\right) + \tan^{-1}\left(\frac{2}{9}\right) = \cot^{-1}\left(\frac{9}{2}\right)$.

4. Attempt any THREE of the following :

12

(a) If $\left\{ 3 \begin{bmatrix} 3 & 1 \\ 4 & 0 \\ 3 & -3 \end{bmatrix} - 2 \begin{bmatrix} 0 & 2 \\ -2 & 3 \\ -5 & 4 \end{bmatrix} \right\} \begin{bmatrix} -1 \\ 2 \end{bmatrix} = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$, then find x , y and z .

(b) Resolve into partial fractions :

$$\frac{x^2 + 23x}{(x^2 + 1)(x + 3)}$$

- (c) Prove that : $\sin(20^\circ) \cdot \sin(40^\circ) \cdot \sin(60^\circ) \cdot \sin(80^\circ) = \frac{3}{16}$.
- (d) Prove that : $\frac{1 - \tan 2A \cdot \tan A}{1 + \tan 2A \cdot \tan A} = \frac{\cos 3A}{\cos A}$.
- (e) If $\cos A = \frac{-3}{5}$, $\sin B = \frac{20}{29}$, A and B are in the 3rd and 2nd quadrant.
Find $\tan(A + B)$.

5. Attempt any TWO of the following :

12

- (a) (i) Find the equation of the line passing through the points $(-4, 6)$ and $(8, -3)$.
- (ii) Find the perpendicular distance between the point $(3, 2)$ and the line $4x - 6y - 5 = 0$.
- (b) (i) Find the acute angle between the lines $3x - y = 4$ and $2x + y = 3$.
- (ii) Find the equation of line passing through the point of intersection of line $2x + 3y = 13$ and $5x - y = 7$ and perpendicular to the line $3x - y + 7 = 0$.
- (c) (i) Find the capacity of a cylindrical water tank whose radius is 2.1 m and height 5 m.
- (ii) A garden is of the form of a rectangle $12 \text{ m} \times 10 \text{ m}$ in which the width 1 metre surrounds the garden. Find the actual area of the garden.

6. Attempt any TWO of the following :

12

- (a) Using matrix inversion method, solve the equations :
- $$x + 3y + 2z = 6; 3x - 2y + 5z = 5 \text{ and } 2x - 3y + 6z = 7.$$
- (b) Find mean, standard deviation and coefficient of variance of the following data :

Wages in ₹	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
No. of students	3	9	15	8	3

- (c) (i) Find the range and coefficient of range for the following data :

Marks	1 – 10	11 – 20	21 – 30	31 – 40	41 – 50
No. of students	5	8	12	8	7

- (ii) Two factories A and B are engaged in the same industry, in their area the average weekly wages (in ₹) and the S.D. are as follows :

Factory	Average Wages	S.D.
A	34.5	5.0
B	28.5	4.5

Which factory is more consistent ?
