24225

3 Hours / 70 Marks   Seat No.

Instructions –   (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Use of Non-programmable Electronic Pocket Calculator is permissible.

(6) 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) Find the value of $\log \frac{1}{2} - \log \frac{5}{6} + \log \frac{3}{4} - \log \frac{7}{8}$

b) Find the area of triangle whose vertices are at the points (–5, –1) (3, –5) and (5, 2)

c) Without using calculator find the value of $\sin(-330°)$

d) Find area of a rhombus whose diagonals are of the lengths 10 cm and 8.2 cm.

e) The length, breadth and height of a cuboid are 9cm, 13cm and 18cm respectively. Find total surface area.

f) Co-efficient of variation of a certain distribution is 5 and mean is 60. Find the standard deviation.

g) Find range and coefficient of range of given data; 5, 7, 9, 13, 11, 5, 3

Marks

2. **Attempt any THREE of the following.** 12

a) If $A = \begin{bmatrix} 1 & 3 & 2 \\ -1 & 2 & 0 \\ 4 & 0 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 2 & 0 \\ 1 & 0 & 3 \end{bmatrix}$ $C = \begin{bmatrix} 2 & 1 & 2 \\ 2 & 2 & 1 \\ 1 & 2 & 2 \end{bmatrix}$

then find the matrix D such that; $2A - 3B - D = C$

b) Resolve into partial fraction $\dfrac{x^2 + 4x + 1}{(x-1)(x+1)(x+3)}$

c) The following equation are obtained in an electrical experiment. Find the values of current. I_1, I_2, I_3 by creamer's rule.

$3I_1 + 3I_2 - I_3 = 11$
$2I_1 - I_2 + 2I_3 = 9$
$4I_1 + 3I_2 + 2I_3 = 25$

d) Calculate mean deviation from mean for given data;
12, 6, 7, 3, 15, 10, 18, 5.

3. **Attempt any THREE of the following.** 12

a) Without using calculator, Prove that
$\sin 420° \cdot \cos 390° + \cos(-300°) \sin(-330°) = 1$

b) Prove that ; $\sin A \cdot \sin(60-A) \cdot \sin(60+A) = \dfrac{1}{4} \sin 3A$

c) Prove that ; $\tan^{-1}\left(\dfrac{1}{2}\right) + \tan^{-1}\left(\dfrac{1}{3}\right) = \dfrac{\pi}{4}$

d) Prove that $\dfrac{\sin 7x + \sin x}{\cos 5x - \cos 3x} = \sin 2x - \cos 2x \cot x$

Marks

4. **Attempt any THREE of the following.** **12**

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

b) Resolve into partial fraction $\dfrac{x^2 - x + 3}{(x-2)(x^2+1)}$

c) If $\tan \dfrac{A}{2} = \dfrac{1}{\sqrt{3}}$, find $\sin A$

d) Prove that ; $\cos 20° \cdot \cos 40° \cdot \cos 60° \cdot \cos 80° = \dfrac{1}{16}$

e) If A and B both are obtuse angles and $\sin A = \dfrac{5}{13}$,

$\cos B = \dfrac{-4}{5}$, evaluate $\cos(A+B)$

5. **Attempt any TWO of the following** **12**

a) i) Find the equation of straight line passing through the points $(-4, 6)$ and $(8, -3)$

ii) Find the length of perpendicular from the point $(3, 4)$ on the straight line $3x + 4y = 5$

b) i) Find acute angle between the lines $2x + 3y + 5 = 0$ and $x - 2y - 4 = 0$

ii) Find the equation of line passing through the point of intersection of lines $4x + 3y = 8$, $x + y = 1$ and parallel to the line $5x - 7y = 3$

c) i) The area of a rectangular courtyard is 3000 sq.m. It's sides are in the ratio 6:5. Find the perimeter of the courtyard

ii) A swimming pool is 12 m long and 7.5 m broad. It is 2.5 m deep at it's deep end calculate it's capacity.

Marks

6. **Attempt any TWO of the following.** 12

a) Calculate mean, standard deviation and coefficient of variance from the given data

Rainfall	70 - 80	80 - 90	90 - 100	100 - 110	110 - 120	120 - 130	130 - 140	140 - 150
No. of Places	6	7	12	19	21	18	11	6

b) i) Find range and coefficient of range for following distribution

Max. temp.	25-26	27-28	29-30	31-32	33-34	35-36
No. of days	2	11	12	10	4	1

ii) The mean and standard deviations of two students A and B in certain test series are given below.

Students	Mean	S.D
A	40	35.4
B	25	12.7

Which student is more consistent in his studies?

c) Solve the following equation by matrix inversion method.
$x+y+z = 3$, $3x-2y+3z = 4$, $5x+5y+z = 11$

_____