22107

23124

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) 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) Prove that $\frac{1}{\log_3 6} + \frac{1}{\log_8 6} + \frac{1}{\log_9 6} = 3$

b) Find the value of $\begin{vmatrix} 2 & 3 & 5 \\ 1 & 4 & 2 \\ 3 & 1 & 6 \end{vmatrix}$

c) If the diagonals of a rhombus are 16 cm and 12 cm. find its area.

d) Find the volume of sphere whose surface area is 616 sq.m.

e) Find the length of the longest pole that can be placed in a room. 12 m long, 9 m broad and 8 m high.

f) Calculate the mean deviation about the mean of digits:

1, 2, 3, 4, 5, 6, 7, 8, 9

g) If mean is 82.5, standard deviation is 7.2. Find coefficient of variance.

Marks

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

a) If $A = \begin{bmatrix} -1 & 2 & -3 \\ 0 & 1 & -2 \end{bmatrix}$; $B = \begin{bmatrix} 4 & 5 & -6 \\ 3 & 1 & 2 \end{bmatrix}$ and $C = \begin{bmatrix} 5 & -1 & -1 \\ 2 & 3 & -1 \end{bmatrix}$

find matrix 'X' such that $3A + 2B - X = C$.

b) Resolve into partial fractions.

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

c) Solve the following equations by Cramer's rule.
$x + y + z = 6$; $2x + y - 2z + 2 = 0$, $x + y - 3z + 6 = 0$

d) Find the standard deviation of following data.

C.I.	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) Find the value of $\cos(510^\circ) \cdot \cos(330^\circ) + \sin(390^\circ) \cdot \cos(120^\circ)$.
[Without using calculator]

b) Prove that $\sin(A+B) \cdot \sin(A-B) = \cos^2 B - \cos^2 A$

c) Prove that $\frac{\sin 7A + \sin A}{\cos 5A - \cos 3A} = \sin 2A - \cos 2A \cdot \cot A$

d) Prove that $\tan^{-1}\left(\frac{1}{11}\right) + \cot^{-1}\left(\frac{6}{5}\right) = \sec^{-1}(\sqrt{2})$

Marks

4. Attempt any <u>THREE</u> of the following: **12**

a) If $A = \begin{bmatrix} 1 & -2 \\ 3 & 5 \end{bmatrix}$; $B = \begin{bmatrix} 4 & 0 \\ -1 & 2 \end{bmatrix}$; $C = \begin{bmatrix} -1 & 0 \\ 0 & 3 \end{bmatrix}$

Verify that (AB)C = A(BC)

b) Resolve into partial fraction $\frac{x + 3}{(x^2 - 1)(x + 5)}$

c) Prove that $\frac{\sin 3\theta}{\sin\theta} - \frac{\cos 3\theta}{\cos\theta} = 2$.

d) If $\tan(x + y) = \frac{3}{4}$ and $\tan(x - y) = \frac{1}{3}$ find $\tan 2x$.

e) Prove that $\sin 10^\circ \cdot \sin 30^\circ \cdot \sin 50^\circ \cdot \sin 70^\circ = \frac{1}{16}$.

5. Attempt any <u>TWO</u> of the following: **12**

a) i) Find acute angle between the lines $2x + y - 1 = 0$ and $3x + y + 4 = 0$.

ii) Find the perpendicular distance between the parallel lines. $3x + 2y - 6 = 0$ and $6x + 4y - 24 = 0$

b) i) Find the equation of straight line passing through the point of intersection of the line $4x + 3y = 8$; $x + y = 1$ and parallel to the line $5x - 7y = 3$.

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

c) A circus tent is cylindrical to a height of 3 m and conical above it. It its diameter is 105 m and slant height of the cone is 5 m. Calculate the total area of the canvas required.

Marks

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

a) i) Find the mean deviation from mean of the following distribution.

Weight (in grams)	10-15	15-20	20-25	25-30	30-35	35-40
No. of Items	7	12	16	25	19	15

ii) Find the standard deviation of following data.

C.I.	0-10	10-20	20-30	30-40	40-50
Frequency	3	5	8	3	1

b) i) From the following data, calculate range and co-efficient of range.

Marks	10-19	20-29	30-39	40-49	50-59	60-69
No. of Students	6	10	16	14	8	4

ii) The runs scored by two batsman A and B in 5 one day matches are given below.

A	48	50	39	46	37
B	50	52	60	55	53

Who is more consistent? Why?

c) Solve the following equations, by using matrix inversion method. $x + 3y + 2z = 6$; $3x - 2y + 5z = 5$; $2x - 3y + 6z = 7$

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