23242

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) Assume suitable data, if necessary.

(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 x if $\log_3(x + 6) = 2$.

(b) Find x if $\begin{vmatrix} 4 & 3 & 9 \\ 3 & -2 & 7 \\ 11 & 4 & x \end{vmatrix} = 0$.

(c) Without using calculator, find the value of $\cos(105°)$.

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

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

(f) Find range and coefficient of range 40, 52, 47, 28, 45, 36, 47, 50.

(g) If mean is 82 and standard deviation is 7, find coefficient of variance.

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

(a) If $A = \begin{bmatrix} 3 & -1 \\ 2 & 4 \end{bmatrix}$ & $B = \begin{bmatrix} 1 & 2 \\ -3 & 0 \end{bmatrix}$ find matrix X such that $2X + 3A - 4B = I$.

(b) Resolve into Partial fractions : $\dfrac{x^2 + 23x}{(x + 3) \cdot (x^2 + 1)}$

(c) Solve the following equations by Cramer's rule :

$x + y + z = 2; \; y + z = 1; \; x + z = 3$

(d) Calculate mean deviation about mean : 3, 6, 5, 7, 10, 12, 15, 18

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

(a) Simplify : $\dfrac{\cos^2 (180° - \theta)}{\sin (-\theta)} + \dfrac{\cos^2 (270° + \theta)}{\sin (180° + \theta)}$

(b) Without using calculator, find the value of $\sin 150° + \cos 300° - \tan 315° + \sec^2 3660°$.

(c) Prove that :

$\dfrac{\cos 2A + 2 \cos 4A + \cos 6A}{\cos A + 2 \cos 3A + \cos 5A} = \cos A - \sin A \cdot \tan 3A$

(d) Prove that :

$\sin 20° \cdot \sin 40° \cdot \sin 60° \cdot \sin 80° = \dfrac{3}{16}$

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

(a) Find x & y if

$$\left\{ 4 \begin{bmatrix} 1 & 2 & 0 \\ 2 & -1 & 3 \end{bmatrix} - 2 \begin{bmatrix} 1 & 3 & -1 \\ 2 & -3 & 4 \end{bmatrix} \right\} \begin{bmatrix} 2 \\ 0 \\ -1 \end{bmatrix} = \begin{bmatrix} x \\ y \end{bmatrix}$$

(b) Resolve into Partial Fractions : $\dfrac{3x-1}{(x-4)\cdot(x^2-1)}$.

(c) Prove that :

$$\cos 20°\cdot\cos 40°\cdot\cos 60°\cdot\cos 80° = \dfrac{1}{16}$$

(d) If $\tan\left(\dfrac{\theta}{2}\right) = \dfrac{2}{3}$ find the value of $2\sin\theta + 3\cos\theta$.

(e) Prove that :

$$\tan^{-1}\left(\dfrac{1}{7}\right) + \tan^{-1}\left(\dfrac{1}{13}\right) = \cos^{-1}\left(\dfrac{9}{2}\right).$$

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

(a) Attempt the following :

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

   (ii) Find the equation of line passing through the point (4, 5) & perpendicular to the line $7x - 5y = 420$.

(b) Attempt the following :

   (i) Find length of the perpendicular from the point (2, 3) on the $4x - 6y - 3 = 0$.

   (ii) Find equation of line passing through point (2, 3) & having slope 5 units.

(c) Attempt the following :

   (i) A square grassy plot is of side 100 meter. It has a gravel path 10 meters wide all around it on the inside. Find area of the path.

   (ii) Find the capacity of a cylindrical water tank whose radius is 2.1 m and length is 5 m.

6. Attempt any TWO of the following : 12

(a) Calculate mean, standard deviation & co-efficient of variance of the following data :

C.I.	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Freq.	03	05	08	03	01

(b) Attempt the following :

(i) Calculate range and coefficient of range from the following data :

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

(ii) The data of runs scored by two batsman A & B in five one day matches is given below :

Batsman	Average run scored	Standard Deviation
A	44	5.1
B	54	6.31

State which batsman is more consistent.

(c) Solve following by matrix inversion method :

$x + 3y + 2z = 6$

$3x - 2y + 5z = 5$

$2x - 3y + 6z = 7$

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