22103

12223

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 x, if $\log_3 (x + 5) = 4$.

(b) Find the value of $\begin{vmatrix} 3 & -5 & -1 \\ 1 & 3 & 5 \\ -5 & 1 & 3 \end{vmatrix}$.

(c) Without using calculator find the value of cos(75°).

(d) The length of one side of the rectangle is twice the length of its adjacent side. If the perimeter of rectangle is 60 cm, find the area of rectangle.

(e) The length, breadth & height of a cuboid are 26 cm, 20 cm & 12 cm respectively. Find the total surface area of cuboid.

(f) If mean is 34.5 & standard deviation is 5. Find the coefficient of variance.

(g) Find the range & coefficient of range for the data : 45, 42, 39, 40, 48, 41, 45, 44.

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

(a) If $A = \begin{bmatrix} 2 & 1 \\ 0 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 2 \\ 3 & -2 \end{bmatrix}$ whether AB is singular or non-singular matrix.

(b) Resolve into partial fractions : $\frac{2x + 3}{x^2 - 2x - 3}$

(c) Using Cramer's rule solve : $x + y - z = 0$, $2x + y + 3z = 9$, $x - y + z = 2$

(d) Calculate the mean deviation about mean of the given data :

17, 15, 18, 23, 25, 22, 11, 5

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

(a) Without using calculator, find the value of

$\sin 150° + \cos 300° - \tan 315° + \sec^2 3660°$

(b) Prove that $\sqrt{2 + \sqrt{2 + 2\cos 4\theta}} = 2\cos\theta$.

(c) Show that $\frac{\sin 7x + \sin x}{\cos 5x - \cos 3x} = \sin 2x - \cos 2x.\cot x$.

(d) Show that : $\cos^{-1}\left(\frac{4}{5}\right) - \cos^{-1}\left(\frac{12}{13}\right) = \cos^{-1}\left(\frac{63}{65}\right)$.

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

(a) Find x, y, z if $\left\{\begin{bmatrix}1 & 3 & 2\\ 2 & 0 & 1\\ 3 & 1 & 2\end{bmatrix}+2\begin{bmatrix}3 & 0 & 2\\ 1 & 4 & 5\\ 2 & 1 & 0\end{bmatrix}\right\}\begin{bmatrix}1\\ 2\\ 3\end{bmatrix}=\begin{bmatrix}x\\ y\\ z\end{bmatrix}$.

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

(c) Show that $\sin(10°)\sin(30°)\sin(50°)\sin(70°)=\frac{1}{16}$.

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

(e) If α & β both are obtuse angles & $\sin\alpha=\frac{5}{13}$, $\cos\beta=\frac{-4}{5}$, find $\cos(\alpha+\beta)$.

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

(a) (i) Find length of the perpendicular from the point (5, 6) on the line $2x + y + 6 = 0$. **3**

(ii) Find the equation of line passing through the point (–3, 2) & having slope $\frac{5}{2}$. **3**

(b) (i) Find the equation of line passing through the point (3, 4) & perpendicular to the line $3x + 2y + 5 = 0$ **3**

(ii) Find the acute angle between the lines $3x - y = 4$, $2x + y = 3$. **3**

(c) (i) Find the capacity of a cylindrical water tank whose radius is 2.1 m & length is 5 m. **3**

(ii) The volume of cube is 1000 cm^3. Find its total surface area. **3**

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

(a) Calculate the mean, standard deviation & coefficient of variance of the following data :

Class interval	70-80	80-90	90-100	100-110	110-120	120-130	130-140	140-150
Frequency	6	7	12	19	21	18	11	6

(b) (i) Find the range & coefficient of range for the following data : **3**

Marks	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99
No. of Students	10	15	16	20	21	22	9	8

(ii) The following data pertain to two workers doing the same job in a factory. **3**

	Worker A	**Worker B**
Mean time of completing the job (in minutes)	40	42
Standard deviation (minutes)	8	6

Who is more consistent ?

(c) Solve the following equations by matrix inversion method :

$2x + y = 3$, $2y + 3z = 4$, $2x + 2z = 8$
