22107

12425

03 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. Solve any FIVE of the following: **10**

a) If $\frac{\text{Log } x}{a} = \frac{\text{Log } y}{5} = \frac{\text{Log } z}{7}$ and $x\ y^2\ z^3 = 1$ then find a.

b) Find x, if $\begin{vmatrix} x & 1 & 2 \\ 3 & 4 & 2 \\ 1 & 3 & 1 \end{vmatrix} = 0$

c) Prove that $\sin\left(\frac{\pi}{2} + \theta\right) = \cos\theta$.

d) A match box measures 4cm × 2.5cm × 1.5cm. What will be the volume of pocket containing 12 such boxes.

e) The diagonal of a cube is $12\sqrt{3}$ cm. Find the edge of the cube.

f) Find the range and coefficient of range of the following distribution.

xi:	10	20	30	40	50
fi:	7	5	3	2	1

g) Find the standard deviation for the following data :
1, 2, 3, 4, 5, 6, 7, 8, 9.

P.T.O.

Marks

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

a) If $A = \begin{bmatrix} 2 & 5 \\ 6 & 7 \end{bmatrix}$, Find $A^2 + 4A + 2I$ Where I is unit matrix.

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

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

$x + y = 4 - z$, $y + z = 1 - 2x$, $x + z = y$

d) Find the mean deviation from mean of the following distribution:

Marks	0-10	10-20	20-30	30-40	40-50
No. of Students	05	08	15	16	06

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

a) Prove that : $\frac{1-\tan 2A.\tan A}{1+\tan 2A.\tan A} = \frac{\cos 3A}{\cos A}$

b) Prove that : $\tan\left(\frac{\pi}{4}+A\right) = \frac{\cos A+\sin A}{\cos A-\sin A}$

c) Without using calculator find the value of $\cos 75^\circ$.

d) Show that $\tan^{-1}\left(\frac{1}{2}\right) + \tan^{-1}\left(\frac{1}{5}\right) + \tan^{-1}\left(\frac{1}{8}\right) = \frac{\pi}{4}$.

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

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

b) If $A = \begin{bmatrix} 2 & 3 & -1 \\ 4 & 5 & 0 \end{bmatrix}$, $B = \begin{bmatrix} -1 & 2 & 4 \\ 1 & 3 & 0 \end{bmatrix}$ verify that $(A+B)^T = A^T+B^T$.

c) Using matrix inversion method solve the equation:
$x + y + z = 5$, $x + y - z = 3$, $x - y = 2$

d) Show that $\cos 10^\circ \cos 50^\circ \cos 70^\circ = \frac{\sqrt{3}}{8}$.

e) If $\tan A = \frac{1}{3}$, $\tan B = \frac{1}{4}$, where $O < A < \frac{\pi}{2}$, $\pi < B < \frac{3\pi}{2}$ Find $\sin(A + B)$

Marks

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

a) Attempt the following:

i) Show that the lines $2x + 3y - 1 = 0$ and $3x - 2y + 6 = 0$ are prependicular to each other.

ii) Find the slope of a line whose inclinition is 120° OR $\frac{2\pi^{C}}{3}$.

b) Attempt the following:

i) Find the equation of Line parallel to $3x - 2y + 5 = 0$ and passing through the point $(5, -6)$

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

c) Attempt the following:

i) Find the area of the following: Fig. No. 1

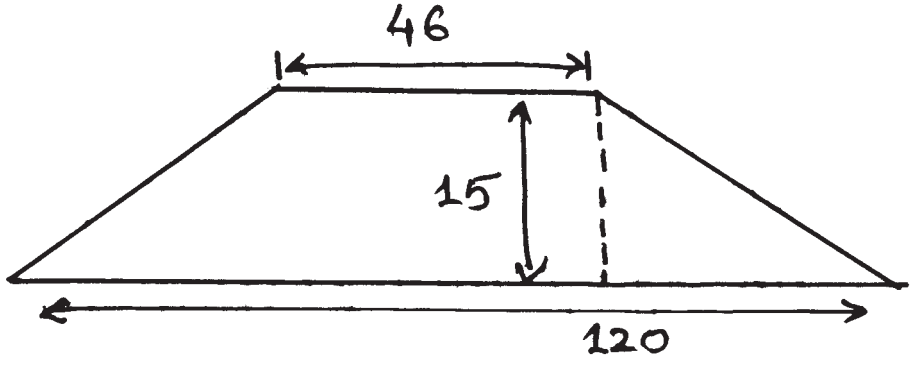

Fig. No. 1

ii) A wall of length 10m was to be built across an open ground. The height of the wall is 4m and thickness of the wall is 24cm. If this wall is to be built up with bricks whose dimensions are 24cm × 12cm × 8cm, how many bricks would be required?

Marks

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

a) Calculate the standard deviation for following distribution:

Class Intervals	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40
Frequency	3	5	9	15	20	16	10	2

Also Find:

i) Variance

ii) Coefficient of Variance.

b) Attempt the following:

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

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	09	08

ii) Two sets of observations are given below:

Set - I	Set - II
$\bar{x} = 82.5$	$\bar{x} = 98.75$
$\sigma = 7.3$	$\sigma = 8.35$

Which of two sets is more consistent.

c) Attempt the following:

i) Find the equation of straight line which is perpendicular to the line $5x - 2y = 7$ and passing through the mid-point of the line joining (2, 7), (–4, 1)

ii) The radius of base of cylinder is 4cm and its height is 25cm. Find the volume of cylinder.