22107

22223

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) Assume suitable data, if necessary.

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

(7) 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 $\log\left[\frac{25}{77}\right] + \log\left[\frac{121}{35}\right] + \log\left[\frac{49}{55}\right]$

b) Using determinants, Find the area of the triangle whose vertices are (1, –1), (2, 4) and (–3, 5).

c) Without using calculator find the value of Sin (–105°).

d) The area of a trapezium is 34 cm^2 and the length of one of the parallel sides is 10 cm and it's height is 4 cm. Find the length of the other parallel side.

e) A godown is in the form of cuboid. The length, breadth and height of godown are 60 m , 40 m and 30 m respectively, find volume of godown.

f) Find the range and coefficient of range for the data : 61, 2, 61, 42, 59, 78, 13 and 221.

g) If standard deviation is 5 and coefficient of variation is 14.5 find the mean.

P.T.O.

Marks

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

a) If $A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 4 & 5 \\ 7 & 8 & 9 \end{bmatrix}$, $B = \begin{bmatrix} 2 & 0 & 3 \\ 4 & 0 & -1 \\ 2 & 3 & 0 \end{bmatrix}$ Evaluate $2A - 3B$.

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

c) The following equations are obtained in electrical experiments:
$5V_1 - 7V_2 + V_3 = 11$; $6V_1 - 8V_2 - V_3 = 15$;
$3V_1 + 2V_2 - 6V_3 = 7$ Find V_1, V_2 and V_3 by using Cramer's rule.

d) Find standard deviation of the following data:

Class interval	0–4	4–8	8–12	12–16
Frequency	4	8	2	1

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

a) Prove that $\frac{\sin 5A + \sin 3A}{\cos 5A + \cos 3A} = \tan 4A$

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

c) Prove that:
$\tan\left(\frac{\pi}{4} + A\right) - \tan\left(\frac{\pi}{4} - A\right) = 2\tan 2A$

d) Prove that $\tan^{-1}\left(\frac{3}{4}\right) + \tan^{-1}\left(\frac{1}{7}\right) = \frac{\pi}{4}$

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

a) If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, show that $A^2 - 5A + 7I = 0$
Where I is a unit matrix of order 2 and 'O' is null matrix of order 2.

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

c) Prove that
$\cos 20° \cos 40° \cos 60° \cos 80° = \frac{1}{16}$

d) Show that $\frac{\sin 75° - \sin 15°}{\cos 75° + \cos 15°} = \frac{1}{\sqrt{3}}$

e) Prove that $\sin^{-1}\left(\frac{3}{5}\right) - \cos^{-1}\left(\frac{12}{13}\right) = \sin^{-1}\left(\frac{16}{65}\right)$

Marks

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

a) Attempt the following:

i) Find the length of the perpendicular drawn from the point (4, 5) upon the straight line $3x + 4y = 10$.

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

b) Attempt the following:

i) Find the distance between the parallel straight lines $5x - 2\sqrt{6}y + 1 = 0$ and $5x - 2\sqrt{6}y - 10 = 0$

ii) Find the equation of line passing throught the point (4, –5) and perpendicular to the line $3x + 4y + 5 = 0$

c) Attempt the following:

i) Find the height of a cylinder whose radius is 7 cm and the total surface area is 968 cm^2.

ii) The volume of cube is 1000 cm^3. Find it's total surface area.

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

a) Find mean, standard deviation and 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	06

b) Attempt the following:

i) The two sets of observation are given below:

Set I	Set II
mean $(\bar{x})$ = 83.4	mean $(\bar{x})$ = 51.85
Standard deviation (σ) = 6.7	Standard deviation (σ) = 7.45

Which of the two sets is more consistent?

ii) Find the mean of the following data:

Class interval	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

c) Solve the following equations by matrix inversion method.

$9x + 4y + 3z = -1$

$5x + y + 2z = 1$

$7x + 3y + 4z = 1$