17104

13141

3 Hours / 100 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.

Marks

1. Attempt any <u>TEN</u> of the following: **20**

a) Find x if $\begin{vmatrix} 0 & 7 & -2 \\ 11 & x & 10 \\ 4 & 8 & 1 \end{vmatrix} = 0$

b) If $A = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$ $B = \begin{bmatrix} 3 & 7 \\ 1 & 9 \end{bmatrix}$ Find $2A + 3B$.

c) If $A = \begin{bmatrix} 2 & 4 & 4 \\ 4 & 2 & 4 \\ 4 & 4 & 2 \end{bmatrix}$ Find A^2.

Marks

d) If $A = \begin{bmatrix} 6 & 5 \\ 2 & 1 \end{bmatrix}$ Find Adj. A.

e) Resolve into partial fraction $\frac{2x}{x^2 + x - 2}$

f) Prove that $\text{cosec}^2\,\theta - \cos^2\theta \cdot \text{cosec}^2\theta = 1$

g) If cos A = 0·4 Find the value of cos 3A.

h) If $\sin\theta = \frac{15}{17}$ where θ lies in II quardrant.

Find the value of $\tan\theta$.

i) If $\tan^{-1}(1) + \tan^{-1}(x) = 0$ Find the value of x.

j) Find intercepts of a line $2x + 3y = 6$ an co-ordinates axes.

k) Find the acute angle between the lines whose slopes are $\sqrt{3}$ and $\frac{1}{\sqrt{3}}$.

l) Find

i) Range

ii) Co-efficient of range of the following data:

50, 90, 120, 40, 180, 200, 80.

Marks

2. Attempt any <u>FOUR</u> of the following: 16

a) Solve the following equations by using Cramer's rule.

$x + y + z - 6 = 0,\ 2x + y - 2z + 2 = 0,\ x + y - 3z + 6 = 0$

b) If $A = \begin{bmatrix} 2 & -3 \\ 1 & 5 \end{bmatrix}$, $B = \begin{bmatrix} 3 & -1 & 2 \\ 1 & 0 & 1 \end{bmatrix}$

verify that $(A \cdot B)^T = B^T \cdot A^T$.

c) Find inverse of matrix by adjoint method.

If $A = \begin{bmatrix} 2 & -1 & -3 \\ 3 & -4 & -2 \\ 5 & 2 & 4 \end{bmatrix}$

d) If I is unit matrix of order 3×3 and $A = \begin{bmatrix} 1 & 2 & 6 \\ 7 & 4 & 10 \\ 1 & 3 & 5 \end{bmatrix}$

Find $A^2 - 3A + I$.

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

f) Resolve into partial fraction.

$$\frac{x^2 - 2x + 7}{(x+1)(x-1)^2}$$

Marks

3. Attempt any <u>FOUR</u> of the following: **16**

a) Prove that: $\sqrt{\frac{1-\cos A}{1+\cos A}} = \operatorname{cosec} A - \cot A$.

b) Prove that: $\frac{\sec 4A - 1}{\sec 2A - 1} = \frac{\tan 4A}{\tan A}$.

c) Prove that:

$$\frac{\cos 2A + 2\cos 4A + \cos 6A}{\cos A + 2\cos 3A + \cos 5A} = (\cos A - \sin A \cdot \tan 3A).$$

d) Prove that: $\cos(A + B) = \cos A \cos B - \sin A \sin B$.

e) In ΔABC prove that:

$$\cos A + \cos B - \cos C = -1 + 4\cos\frac{A}{2}\cos\frac{B}{2}\sin\frac{C}{2}$$

f) Show that: $\cos^{-1}\left(\frac{4}{5}\right) + \tan^{-1}\left(\frac{3}{5}\right) = \tan^{-1}\left(\frac{27}{11}\right)$.

4. Attempt any <u>FOUR</u> of the following: **16**

a) Show that: $\frac{\sin A}{1+\cos A} + \frac{1+\cos A}{\sin A} = 2\operatorname{cosec} A$.

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

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

d) Prove that: $\sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 80^\circ = \frac{3}{16}$.

Marks

e) If $\sin\alpha = \frac{-5}{13}$, $\cos\beta = \frac{-7}{25}$ and α, β lies in the third quadrant find $\sin(\alpha - \beta)$.

f) Prove that: $\cos^{-1}\left(\frac{4}{5}\right) + \cos^{-1}\left(\frac{12}{13}\right) = \cos^{-1}\left(\frac{33}{65}\right)$.

5. Attempt any <u>FOUR</u> of the following: **16**

a) Find the equation of a straight line that passes through (3, 4) and perpendicular to the line $3x + 2y + 5 = 0$.

b) Find the equation of the straight line which passes through the point of intersection of the lines $2x + 3y = 13$, $5x - y = 7$ and perpendicular to the line $2x - 5y + 9 = 0$.

c) Find the length of perpendicular from the point (3, 4) to the line $3x + 4y - 5 = 0$.

d) Find perpendicular distance between the parallel lines $5x - 12y + 1 = 0$ and $10x - 24y - 1 = 0$.

e) Find the equation of perpendicular bisector of the joint of A $(-2, 3)$ and B $(8, -1)$.

f) Prove that: $\tan^{-1}(1) + \tan^{-1}(2) + \tan^{-1}(3) = \pi$.

6. Attempt any <u>FOUR</u> of the following: **16**

a) 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

Marks

b) Calculate standard deviation of the following frequency distribution:

Weekly Expenditure below Rs.	5	10	15	20	25
No. of students	6	16	28	38	46

c) The two sets of observations are given below:

Set I Set II

$\overline{X} = 82.5$ $\overline{X} = 48.75$

$\sigma = 7.3$ $\sigma = 8.35$

Which of two sets is more consistent ?

d) If $A = \begin{bmatrix} 2 & 4 \\ 1 & 1 \end{bmatrix}$ Prove that $A^2 - 3A = 2I$

Where I is unit matrix of order 2.

e) Solve by matrix method the set of equations.

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

f) Find various for the following data:

CI	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40
fi	3	5	9	15	20	16	10	2

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