16172

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) 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. **Solve any TEN of the following:** **20**

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

b) If $A = \begin{bmatrix} 2 & -1 \\ 4 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 3 & -2 \\ -1 & 4 \end{bmatrix}$ find the matrix 'X' such that

$2A + X = 3B$

c) If $A = \begin{bmatrix} 3 & 9 \\ -1 & -3 \end{bmatrix}$ show that A^2 is null matrix.

d) If $A = \begin{bmatrix} 2 & -1 & 3 \\ 4 & 1 & -3 \\ 0 & -1 & 1 \end{bmatrix}$ find |A| and verify that matrix A is singular or non-singular matrix.

P.T.O.

e) Resolve into partial fraction $\dfrac{x+4}{x(x+1)}$

f) Prove that $\dfrac{1}{1-\cos A}+\dfrac{1}{1+\cos A}=2\cosec^2 A$

g) Using compound angle formula find $\cos (75)°$.

h) If $\sin A = \dfrac{1}{2}$ find $\sin(3A)$

i) Express as product form $\cos 4\theta + \cos 8\theta$

j) If $\tan^{-1}(1)+\tan^{-1}(x)=0$ then find 'x'.

k) State the conditions of parallel and perpendicular lines, whose slopes are M_1 and M_2.

l) Find the range of the data
45, 42, 39, 40, 48, 41, 45, 44

2. **Solve any FOUR of the following:** **16**

a) Solve the following equations using Cramer's rule of determinants.
$x+y+\ z=3,$
$x-y+\ z=1,$
$x+y-2z=0$

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

c) Express the matrix A as the sum of symmetric and skew-symmetric
matrices, where A $= \begin{bmatrix} -1 & 7 & 1 \\ 2 & 3 & 4 \\ 5 & 0 & 5 \end{bmatrix}$

d) Find A^{-1} by Adjoint method, If $A = \begin{bmatrix} 2 & -1 & 0 \\ 1 & 0 & 4 \\ 1 & -1 & 1 \end{bmatrix}$

e) Resolve into the partial fractions: $\dfrac{x^2+1}{(x+1)(x^2+4)}$

f) Resolve into the partial fractions: $\dfrac{x^2+1}{x(x^2-1)}$

Marks

3.   **Solve any FOUR of the following:**   **16**

a) Using matrix inversion method, solve the equation:

$x + y + z = 3, x + 2y + 3z = 4, x + 4y + 9z = 6$

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

c) Resolve into partial fraction : $\dfrac{x^4}{x^3+1}$

d) If $\tan\left(\dfrac{\alpha}{2}\right) = \dfrac{1}{\sqrt{3}}$ then find $\sin\alpha$.

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

f) Show that : $\sin 20° \, \sin 40° \, \sin 60° \, \sin 80° = \dfrac{3}{16}$

4.   **Solve any FOUR of the following:**   **16**

a) Prove that : $\sin(A - B) = \sin A \cos B - \cos A \sin B$

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

c) Evaluate: $\tan\left[2\tan^{-1}\dfrac{1}{5}\right]$

d) Show that : $\sin 50° - \sin 70° + \sin 10° = 0$

e) Prove that : $\tan A \, \tan(60 - A) \cdot \tan(60 + A) = \tan 3A$

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

5.   **Solve any FOUR of the following:**   **16**

a) Prove that $\sin 3A = 3\sin A - 4\sin^3 A$

b) Show that $\dfrac{\sin 4A + \sin 5A + \sin 6A}{\cos 4A + \cos 5A + \cos 6A} = \tan 5A$

c) Show that $\cos^{-1}\left(\dfrac{4}{5}\right) - \cos^{-1}\left(\dfrac{12}{13}\right) = \cos^{-1}\left(\dfrac{63}{65}\right)$

Marks

d) Find 'P' if the lines $3x + 4py + 8 = 0$ and $3py - 9x + 10 = 0$ are perpendicular to each other.

e) Find the angle between the lines: $3x - y + 4 = 0$ and $2x + y - 3 = 0$

f) Find the equation of straight line passing through the point of intersection of lines $4x + 3y = 8$ and $x + y = 1$ and parallel to the line $5x - 7y = 3$.

6.   **Solve any FOUR of the following:**   **16**

a) Find the equation of straight line which is perpendicular bisector of the line joining the points A(8, −1) and B (6, 3)

b) Find the equation of the line whose intercept on the X-axis is double that on the y-axis and passing through the point (4, 1)

c) From the following data investigate which set is more consistent:

Set	a.m. $= \overline{x}$	S.D. $= \sigma$
Set I	83.4	5.9
Set II	51.85	7.45

d) Find Range of coefficient of Range for the 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

e) Find the mean deviation for the following data:

Marks	3	4	5	6	7	8
No. of Students	1	3	7	5	2	2

f) Find the standard deviation for the following data:

Class Interval	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40
Frequency	03	05	09	15	20	16	10	02

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