17104

21819

3 Hours / 100 Marks   Seat No. ☐☐☐☐☐☐☐☐

Marks

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

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

b) Find A if, $2A + 3\begin{bmatrix} 1 & 3 \\ 2 & 5 \end{bmatrix} = \begin{bmatrix} 5 & 7 \\ 6 & 3 \end{bmatrix}$

c) If $A = \begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}, B = \begin{bmatrix} 3 & -5 \\ -1 & 2 \end{bmatrix}$ Show that AB = BA = I

d) Resolve into partial fraction $\dfrac{x-2}{x(x-1)}$

e) If $\tan A = \dfrac{1}{2}$, $\tan B = \dfrac{1}{3}$ find $\tan (A+B)$

f) Without using calculator find the value of sin (75°).

P.T.O.

g) Prove that $\tan^{-1}\left(\frac{1}{4}\right) + \tan^{-1}\left(\frac{2}{9}\right) = \cot^{-1}2$

h) Find the principal value of $\tan^{-1}(\sqrt{3})$

i) Find the principal value of $\sec[\cos^{-1}(\sqrt{3}/2)]$

j) Find the distance between point $(-2, 3)$ and the line $3x + 2y + 26 = 0$

k) Find range and coefficient of range of the following data 5, 7, 9, 13, 11, 5, 3

l) Prove that the lines $3x + 2y = 5$ and $2x - 3y = 6$ are perpendicular.

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

a) Solve using Cramer's rule $x + z = 4, y + z = 2, x + y = 0$

b) If $A = \begin{bmatrix} 0 & 1 & -1 \\ 4 & -3 & 4 \\ 3 & -3 & 4 \end{bmatrix}$ prove that $A^2 = I$

c) If $A = \begin{bmatrix} 2 & 4 & 4 \\ 4 & 2 & 4 \\ 4 & 4 & 2 \end{bmatrix}$ show that $A^2 - 8A$ is scalar matrix.

d) If $A = \begin{bmatrix} 2 & 3 & -1 \\ 4 & 5 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 2 & 4 \\ 1 & 3 & 0 \end{bmatrix}$ verify that $(A + B)' = A' + B'$

e) Find A^{-1} By adjoint method if $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & -1 \\ 1 & -1 & 0 \end{bmatrix}$

f) Resolve into partial fractions $\dfrac{3x - 1}{(x - 4)(x + 1)(x - 1)}$

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

a) Using matrix inversion method solve the system of equation
$x + y + z = 3, x + 2y + 3z = 4, x + 4y + 9z = 6$

b) Resolve into partial fractions $\dfrac{x^2 + 23x}{(x + 3)(x^2 + 1)}$

c) Resolve into partial fractions $\dfrac{2x + 1}{x^2(x + 1)}$

Marks

d) In Δ ABC prove that $\tan A + \tan B + \tan C = \tan A \cdot \tan B \cdot \tan C$

e) If $A + B = \frac{\pi}{4}$, show that $(1 + \tan A)(1 + \tan B) = 2$

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

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

a) Prove that $\cos 2\theta = \cos^2\theta - \sin^2\theta$

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

c) Prove that $\dfrac{\sin A + \sin 2A + \sin 3A + \sin 4A}{\cos A + \cos 2A + \cos 3A + \cos 4A} = \tan\dfrac{5A}{2}$

d) If $\tan(A + B) = \frac{3}{4}$ $\tan(A - B) = \frac{77}{36}$ Find the value of $\tan 2B$

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

f) Prove that $\tan^{-1}\left(\frac{1}{2}\right) + \tan^{-1}\left(\frac{1}{3}\right) = \frac{\pi}{4}$

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

a) Prove that $\dfrac{\cos 3A}{\cos A} + \dfrac{\sin 3A}{\sin A} = 4\cos 2A$

b) Prove that $\sin C - \sin D = 2\cos\left(\dfrac{C + D}{2}\right) \cdot \left(\sin\dfrac{C - D}{2}\right)$

c) Without- using calculator prove that

    $\sin 20° \, \sin 40° \, \sin 60° \, \sin 80° = \dfrac{3}{16}$

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

e) If m_1 and m_2 are the slope of the two lines then prove that
    angle between two lines is $\tan\theta = \left|\dfrac{m_1 - m_2}{1 + m_1 m_2}\right|$

f) Find the equation of the line passing through the point of intersection of $2x + y + 6 = 0$ and $3x + 5y - 15 = 0$ and parallel to the line $5x + 6y + 3 = 0$

[4]

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

a) Show that the distance between two parallel lines $ax + by + c_1 = 0$

and $ax + by + c_2 = 0$ is given by $d = \left| \dfrac{c_2 - c_1}{\sqrt{a^2 + b^2}} \right|$

b) Find the angle between the lines $y = 5x + 6$ and $y = x$

c) In the two factories P and Q engaged in the same industries. The average weekly wages and standard deviations are as follows. Which factory P or Q has greater variability in individual wages?

Factories	Averages wages	Standard deviation
P	34.5	5.0
Q	28.5	4.5

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

Marks :	10-19	20-29	30-39	40-49	50-59	60-69
No. of students :	06	10	16	14	08	04

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	0-10	10-20	20-30	30-40	40-50
Frequency	14	23	27	21	15

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