311302

24225

3 Hours / 70 Marks Seat No. | | | | | | | | |

Instructions : (1) All Questions are *compulsory.*

(2) Answer each next main Question on a new page.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

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

Marks

1. Attempt any FIVE of the following : **10**

(a) Find 'x', if $\log_3 (x + 5) = 4$.

(b) Without using calculator, find value of cos 75°.

(c) Find slope and intercepts of the line $3x + 4y = 12$.

(d) Find $\frac{dy}{dx}$, if $y = x^{10} + 10^x + e^x + a^a$.

(e) Find slope of tangent to the curve $y = x^3$ at $x = 4$.

(f) If $f(x) = x^4 - 2x + 7$, then find $f(0) + f(2)$.

(g) Find range and coefficient of range of data : 45, 42, 39, 40, 48, 41, 45, 44.

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

(a) If $A = \begin{bmatrix} 2 & 4 & 4 \\ 4 & 2 & 4 \\ 4 & 4 & 2 \end{bmatrix}$, show that $A^2 - 8A$ is a Scalar matrix.

(b) Find x, y if $\left\{4\begin{bmatrix} 1 & 2 & 0 \\ 2 & -1 & 3 \end{bmatrix} - 2\begin{bmatrix} 1 & 3 & -1 \\ 2 & -3 & 4 \end{bmatrix}\right\}\begin{bmatrix} 2 \\ 0 \\ -1 \end{bmatrix} = \begin{bmatrix} x \\ y \end{bmatrix}$.

(c) Resolve into partial fraction : $\frac{x+3}{(x+1)(x+5)}$.

(d) If $\tan A = \frac{1}{2}$, $\tan B = \frac{1}{3}$, find $\tan (A + B)$.

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

(a) Prove that $\frac{\sin 4\theta + \sin 2\theta}{1 + \cos 2\theta + \cos 4\theta} = \tan 2\theta$.

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

(c) Find the equation of the line passing through the point (3, 4) and perpendicular to the line $2x - 4y + 5 = 0$.

(d) Calculate the mean deviation about mean of the following data :

3, 6, 5, 7, 10, 12, 15, 18

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

(a) Find $\frac{dy}{dx}$ at $\theta = \frac{\pi}{4}$, if $x = a \cos \theta$, $y = b \sin \theta$.

(b) If $x^y = e^{x-y}$, show that $\frac{dy}{dx} = \frac{\log x}{(1 + \log x)^2}$.

(c) If $y = \tan^{-1}\sqrt{\frac{1 - \cos 2x}{1 + \cos 2x}}$, then find $\frac{dy}{dx}$.

(d) Find range and coefficient of range of following data :

Marks	10-19	20-29	30-39	40-49	50-59	60-69
No. of Students	6	10	16	14	8	4

(e) The data of run scored by two batsmen A and B in five one day matches is given below :

Batsmen	**Average run scored**	**S.D.**
A	44	5.1
B	54	6.31

Which batsman has greater variability ?

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

(a) Solve the following equations by matrix inversion method :

$x + 3y + 3z = 12$;

$x + 4y + 4z = 15$;

$x + 3y + 4z = 13$

(b) (i) If $A = 30°$, verify that $\sin 2A = 2 \sin A \cdot \cos A$.

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

(c) (i) Find acute angle between the lines $3x + 2y + 4 = 0$ and $2x - 3y - 7 = 0$.

(ii) Find perpendicular length from point (5, 4) on the straight line $2x + y = 34$.

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

(a) Calculate the mean, S.D. and coefficient of variance of the following data :

C.I.	0-10	10-20	20-30	30-40	40-50
Frequency	3	5	8	3	1

(b) A metal wire 100 cm long is bent to form a rectangle. Find its dimension when its area is maximum.

(c) A telegraph wire hangs in the form of curve $y = a \log\left[\sec\left(\frac{x}{a}\right)\right]$, where 'a' is constant. Show that radius of curvature at any point is $a \sec\left(\frac{x}{a}\right)$.
