311302

12425
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) 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. Attempt any FIVE of the following : **10**

(a) Find 'x', if $\log_2 (x + 2) = 3$

(b) If sin A = 0.4, find the value of sin 3A.

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

(d) If $f(x) = 3x^2 - 5x + 7$, show that $f(-1) = 3\ f(1)$.

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

(f) Find $\frac{dy}{dx}$, if $y = e^x \cdot \sin^{-1} x$.

(g) Find the range and coefficient of the range of the following :

2, 3, 1, 10, 6, 31, 17, 20, 24

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

(a) If $A = \begin{bmatrix} 2 & -3 \\ 1 & 5 \end{bmatrix}$, $B = \begin{bmatrix} 3 & -1 & 2 \\ 1 & 0 & 1 \end{bmatrix}$, verify that $(AB)^T = B^T A^T$.

(b) Resolve into partial fraction $\frac{x}{x^2 - x - 2}$.

(c) Simplify $\frac{1}{\log_5 10} + \frac{1}{\log_{20} 10}$.

(d) If $\tan x = \frac{5}{6}$ and $\tan y = \frac{1}{11}$, show that $x + y = \frac{\pi}{4}$.

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

(a) Prove that $\frac{\cos A}{1 - \tan A} + \frac{\sin A}{1 - \cot A} = \sin A + \cos A$.

(b) Without using calculator, prove that

$\cos 20° \cdot \cos 40° \cdot \cos 60° \cdot \cos 80° = \frac{1}{16}$

(c) Find the equation of straight line passing through the point of intersection of $x + y = 4$ and $2x + y = 4$ and parallel to x-axis.

(d) Find $\frac{dy}{dx}$, if $x^3 + y^3 = 30xy$.

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

(a) If $x = a \cos^3 \theta$ and $y = a \sin^3 \theta$, find $\frac{dy}{dx}$ at $\theta = \frac{\pi}{3}$.

(b) Find maximum and minimum value of the function $y = 2x^3 - 21x^2 + 36x - 20$.

(c) Compute mean deviation for

15, 22, 27, 11, 9, 21, 14, 9

(d) Calculate mean and Standard Deviation of the following frequency distribution :

Class Interval	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Frequency	14	23	27	21	15

(e) Find variance and coefficient of variance for the following distribution :

Class Interval	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
Frequency	4	6	10	18	9	3

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

(a) Solve the following by matrix inversion method :

$3x + y + 2z = 3$; $2x - 3y - z = -3$; $x + 2y + z = 4$

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

(ii) If $\sin\theta = \frac{15}{17}$, where θ lies in 2nd quadrant. Find the value of $\tan\theta$.

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

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

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

(a) Find the equation of tangent and normal to the curve $4x^2 + 9y^2 = 40$ at point (1, 2).

(b) (i) Find the radius of curvature of the curve $y = x^3$ at point (2, 8).

(ii) Find $\frac{dy}{dx}$, if $y = x^{\sin x}$.

(c) The scores of two batsmen/batter A and B in ten innings during a certain season as under :

A	32	28	47	63	71	39	10	60	96	14
B	19	31	48	53	67	90	10	62	40	80

Find which of two batsmen/batter is more consistent in scoring. Why ?

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