

22103

22232

3 Hours / 70 Marks

Seat No.

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- 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.
 - (7) 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) Solve : $\log(x + 3) + \log(x - 3) = 10916$.
- (b) Using determinant find the area of a triangle whose vertices are :
(4, 5), (0, 7) and (-1, 1).
- (c) Without using calculator find the value of $\tan(15^\circ)$.
- (d) Find the area of a plot in the form of a rhombus having diagonals 160 m and 210 m long.
- (e) Find the area between two concentric circles of radius 4 m and 2 m.
- (f) Following are the prices (in ₹) of shares of a company for six days of a week :
200, 210, 208, 100, 220, 250. Calculate the Range.
- (g) The mean and S.D. of a particular distribution are 60 and 5 respectively. Find the co-efficient of variation.



2. Attempt any THREE of the following :

12

(a) Resolve into partial fractions : $\frac{x^2 + 5x + 7}{(x-1)(x+2)(x+4)}$.

(b) If $P = \begin{bmatrix} 1 & 2 & -3 \\ 3 & -1 & 2 \\ -2 & 1 & 3 \end{bmatrix}$, $Q = \begin{bmatrix} 2 & 3 & 1 \\ 3 & 1 & 2 \\ 1 & 2 & 3 \end{bmatrix}$ then find the matrix R such that $P + Q + R = O$.

(c) The sum of three numbers is 2. If twice the second number is added to the sum of first and third, we get 1. On adding the sum of second and third numbers to five times the first number, we get 6. Find the three numbers using Cramer's Rule.

(d) Find the mean deviation from mean for the following distribution :

x_i :	20	18	16	14	12	10	8	6
f_i :	2	4	9	18	27	25	14	1

3. Attempt any THREE of the following :

12

(a) If $\tan x = -3/4$, $3\pi/2 < x < 2\pi$, then find (i) $\sin 2x$ (ii) $\cos 2x$

(b) Prove that : $\sqrt{2 + \sqrt{2 + \sqrt{2 + 2 \cos 4\theta}}} = 2 \cos (\theta/2)$

(c) Prove that : $\sin 20^\circ \sin 40^\circ \sin 60^\circ \sin 80^\circ = 3/16$

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

4. Attempt any THREE of the following :

12

(a) If $A = \begin{bmatrix} 0 & 1 & -1 \\ 4 & -3 & 4 \\ 3 & -3 & 4 \end{bmatrix}$, show that $A^2 = I$.

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

(c) In a ΔABC , prove that :

$$\tan A + \tan B + \tan C = \tan A \cdot \tan B \cdot \tan C$$

(d) Prove that : $\sin 420^\circ \cos 390^\circ + \cos (-300^\circ) \sin (-330^\circ) = 1$.

(e) Prove that : $\frac{\sin 16\theta}{\sin \theta} = 16 \cos \theta \cdot \cos 2\theta \cdot \cos 4\theta \cdot \cos 8\theta$

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

- (a) (i) If the slope of a line passing through the points (4, K) and (-2, -5) is 2, then find K.
- (ii) Find the equation of a line making an angle of 120° with X-axis and passing through (2, 3).
- (b) (i) Find the angle between the lines $x + 5y = 11$ and $5x - y = 11$.
- (ii) Find the perpendicular distance of the point (-3, -4) from the line $4(x + 2) = 3(y - 4)$.
- (c) (i) Find the area in hectare of the piece of land in the form of a quadrilateral ABCD. The diagonal AC is 400 m long and offset to B is 220 m and offset to D is 98 m.
- (ii) A rectangular box $80 \times 50 \times 30$ m is to be painted from outside at the rate of ₹ 1.25 per sq. m. Find the cost of painting it.

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

- (a) Solve the following equations by matrix inversion method :
- $$x + 3y + 2z = 6, 3x - 2y + 5z = 5, 2x - 3y + 6z = 7$$
- (b) The score of two batsmen A and B in ten innings during a certain season are 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 the two batsmen is more consistent using co-efficient of variation.
- (c) Calculate the S.D., co-efficient of S.D., variance and co-efficient of variance of the following data :

Class :	0 – 30	30 – 60	60-90	90-120	120-150	150-180	180-210
Frequency :	9	17	43	82	81	44	24

