Section B

Note : Attempt all the questions.

11. (a) Find :

$$A^2 - 12A + 5I,$$

where, $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{bmatrix}$.

(b) Find inverse of the matrix :

$$\begin{bmatrix} 1 & 2 & 3 \\ 0 & 5 & 0 \\ 2 & 4 & 3 \end{bmatrix}$$

Or

(a) Obtain the value of x from the equation :

$$\tan(90^\circ + A)\sin A + \text{cosec}(90^\circ + A)$$
$$+ x\cot(90^\circ + A) = 0$$

(b) Find the equation of a line which cuts off an intercept of 4 units on negative direction of the y-axis and makes an angle of 120° with the positive direction of x-axis. **6+6**

Subject Code—0403

M.C.A. (First Year) EXAMINATION

(5 Years Integrated Course)

(Batch 2009 Onwards)

MATHEMATICS-I

MCA-103

Time : 3 *Hours*   *Maximum Marks :* 70

Section A

Note : Attempt any *Seven* questions.   **7×5=35**

1. Solve :

$$3x^2 - 2x - \sqrt{3x^2 - 2x + 4} = 16$$

2. If $A = \begin{bmatrix} -1 & 2 \\ 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} 2 & -3 \\ 5 & 1 \end{bmatrix}$, find a matrix C such that :

$$2A + B + C = 0$$

3. Solve using Cramer's rule :

$$x + y + z = 6$$
$$x - y + z = 2$$
$$2x + y - z = 1$$

4. Prove that :

$$\frac{\sin\theta}{1+\cos\theta} + \frac{1+\cos\theta}{\sin\theta} = 2\ \text{cosec}\ \theta$$

5. (a) Find the area of the triangle whose vertices are (4, 4), (3, –2), (–3, 16).

(b) Find the value of K if the slope of the line joining (–8, 11) and (2, K) is $-\dfrac{4}{3}$.

6. Find $\dfrac{dy}{dx}$ where $y = \sqrt{x^2 - 1} + \dfrac{1 - \sqrt{x}}{1 + \sqrt{x}}$.

7. Evaluate :

$$\int x.\log 2x\,dx$$

8. Solve the differential equation :

$$x(1 + y^2)dx + y(1 + x^2)dy = 0$$

9. Find median for the following data :

Class Interval	Frequency
0-10	4
10-20	8
20-30	20
30-40	12
40-50	6

10. Two unbiased dice are thrown simultaneously. Find the probability of :

(i) getting a multiple of 3 as the sum.

(ii) not getting the same number on the dice.

(iii) an even number on the first dice and an odd number on the second dice.

50-60   14

60-70   10

70-80   15

80-90   25

Or

(a) Obtain the coefficient of correlation for the data :

x	y
10	18
14	12
18	24
22	6
26	30
30	36

(b) Obtain mean and variance for a Binomial distribution.   **6+5**

12. (a) Find $\dfrac{dy}{dx}$ if $y = a(1 - \cos\theta),\ x = a(\theta + \sin\theta)$ at $\theta = \dfrac{\pi}{2}$.

(b) Evaluate :

$$\int \frac{dx}{(x-3)(x-4)}$$

Or

Solve the following differential equation :

(a) $\dfrac{dy}{dx} = \dfrac{x+y+1}{x+1}$

(b) $\dfrac{dy}{dx} = (4x + y + 1)^2$.   **6+6**

13. Calculate mean, median and mode for the following data :

Class	Frequency
10-20	4
20-30	12
30-40	40
40-50	20