

June 2008

Roll No.

Subject Code—9471

9471 = $\frac{1}{5}$

M. C. A. (First Year) EXAMINATION

(5 Years Integrated Course)

MCA-103

MATHEMATICS—I

Time : 3 Hours

Maximum Marks : 100

Note : Attempt any *Five* questions. All questions carry equal marks.

1. (a) Solve :

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

(b) Solve the following system of equations by Cramer's rule :

$$3x + y + 2z = 3$$

$$2x - 3y - z = -3$$

$$x + 2y + z = 4$$

(2-28)

P.T.O.

$$952 = \frac{2}{5}$$

2. (a) If

$$A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix},$$

show that $A^2 - 4A - 5I = 0$, where $I, 0$ are the unit matrix and null matrix of order 3, respectively. Use this result to find A^{-1} .

b If $A = \begin{bmatrix} 1 & 2 & -1 \\ 3 & 0 & 2 \\ 4 & 5 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 0 & 1 & 3 \end{bmatrix}$,

verify that $(AB') = B'A'$, where $()'$ indicates transpose.

3. (a) Show that :

$$\frac{\tan \theta}{\sec \theta - 1} + \frac{\tan \theta}{\sec \theta + 1} = 2 \operatorname{cosec} \theta$$

(b) Prove that :

$$\cos 24^\circ + \cos 55^\circ + \cos 125^\circ + \cos 204^\circ + \cos 300^\circ = \frac{1}{2}$$

$$a \sin 2 = \frac{3}{5}$$

- (c) If $\cos A = \frac{1}{7}$ and $\cos B = \frac{13}{14}$, A and B being positive and acute angles, prove that

$$A - B = 60^\circ.$$

- 4 (a) The point (a, b) is equidistant from points $(x+y, y-x)$ and $(x-y, x+y)$, prove that :

$$ay = bx.$$

- (b) Find the equation of a line which passes through $(22, -6)$ and intercept on x -axis exceeds the intercept on y -axis by 5.

- (c) Find the equation of the straight line passing through the point $(-3, 1)$ and perpendicular to the line :

$$5x - 2y + 7 = 0.$$

5. (a) If $x = 2at\sqrt{1-t^2}$, $y = 1-t^2$; find $\frac{dy}{dx}$.
- (b) Find n th differential coefficient of $\sin(ax+b)$.

June 2008

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8.

(b) Solve :

$$\frac{dy}{dx} - \frac{y}{x} = (2x^3 + 8x^2 + 9).$$

7. (a) Find mean and median from the following data :

Class Interval	Frequency
50-60	5
60-70	8
70-80	2
80-90	9
90-100	6
100-110	10

(b) Define standard deviation and coefficient of variation. Find standard deviation for the data :

Marks	No. of Candidates
1-10	3
11-20	16
21-30	26
31-40	31
41-50	16
51-60	8

June 2008

947125
5

Q(a) State and prove Baye's theorem on probability.

(b) Define a Poisson distribution. Find its mean and variance.

(c) Find coefficient of correlation for the data :

x : 1 2 3 4 5

y : 2 5 3 8 7

947125/5