Exam. Code : 107201
Subject Code : 8136

Bachelor of Computer Application (BCA) 1st Semester
(Old Sylb 2016)
MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE
Paper—III

Time Allowed—3 Hours] [Maximum Marks—75

Note :— Attempt any **FIVE** questions. All questions carry equal marks.

1. (a) Solve the system of equation using Cramer's rule :

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

(b) Evaluate $\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix}$.

2. (a) Find eigen value of matrix :

$$A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$$

(b) P.T $A^3 - 4A^2 - 3A + 11\ I = 0$ where

$$A = \begin{bmatrix} 1 & 3 & 2 \\ 2 & 0 & -1 \\ 1 & 2 & 3 \end{bmatrix}.$$

3. (a) Define :

(i) Set

(ii) Symmetric difference of set

(iii) Union of set

(iv) Intersection of two set, each with example.

(b) In a group of 400 people, 250 can speak Hindi and 200 can speak English. How many can speak both Hindi and English ?

4. (a) Let R be relation defined from set A = [2, 3, 4, 5] to B = [3, 6, 7, 10] as follows : (a, b) $\in$ R if and only if a is relatively prime to b. Find domain and range.

(b) Define :

(i) Reflexive relation

(ii) Symmetric relation

(iii) Transitive relation, each with example.

5. (a) Find $\frac{dy}{dx}$ if $y = \log\left[x + \sqrt{a^2 + x^2}\right]$

(b) Find $\frac{dy}{dx}$ if $y = \frac{x + \sin x}{x + \cos x}$.

6. (a) Evaluate $\int x^2 \cos x \, dx$

(b) Evaluate $\int_0^{\pi/2} \frac{\sin x}{1 + \cos^2 x} \, dx$.

7. (a) Events A and B are such that $P(A) = \frac{1}{2}$, $P(B) = \frac{7}{12}$, P (not A or not B) $= \frac{1}{4}$. State whether A and B are independent.

(b) Let E and F be events with $P(E) = \frac{3}{5}$, $P(F) = \frac{3}{10}$ and $P(E \cap F) = \frac{1}{5}$. Are E and F independent ?

8. (a) Evaluate $\int_0^{\pi/2} \frac{dx}{4 \sin^2 x + 5 \cos^2 x} dx$.

(b) A bag contains 4 red and 4 black balls, another bag contains 2 red and 6 black balls. One of the two bag is selected at random and a ball is drawn found to be red. Find probability that ball drawn from first bag.