Exam. Code : 107201
Subject Code : 1775

Bachelor of Computer Application (BCA) 1st Semester

APPLIED & DISCRETE MATHEMATICS

Paper—III

Time Allowed—3 Hours] [Maximum Marks—75

Note :— Attempt ***five*** questions in all by selecting ***one*** question from each unit. All questions carry equal marks. The fifth question may be attempted from any unit.

UNIT—1

1. (a) If A = [1, 2, 3, 4, 5], B = [1, 3, 5, 7, 9], C = [2, 3, 4]
   verify that $A - (B \cup C) = (A - B) \cap (A - C)$.
   (b) Define :
   (i) Union of two set
   (ii) Intersection of two set, each with example.
   (c) A sample of 80 people have reveal that 24 like cinema and 62 like television programmes. Find the number of people who like both cinema and television programmes.

2. (a) Let A = [1, 2, 3], B = [4], C = [5]
   verify that $A \times (B \cup C) = (A \times B) \cup (A \times C)$.
   (b) Determine domain and range of relation R defined by :
   $R = [(x, y) : x \in N, y \in N \text{ and } x + y = 10]$

UNIT—2

3. (a) Draw Truth table $\sim (p \wedge q) \vee \sim (q \rightarrow p)$.

(b) Define :

(i) Tautology

(ii) Contradiction

(iii) Logical equivalence, each with example.

4. (a) Test the validity of the following argument using truth table.

If it rain then crop will be good.

If did not rain, therefore crop will not be good.

(b) Write the truth table :

$$[p \rightarrow (q \vee r)] \vee [p \leftrightarrow \sim r].$$

UNIT—3

5. (a) State and prove De-Morgan law for Boolean algebra.

(b) Show that set of all positive divisor of 12 does not form Boolean algebra under divisibility.

6. (a) Convert into DN form :

$$((xy^1)z)^1 . [(x^1 + z)(y^1 + z^1)^1].$$

(b) Defined :

(i) Fundamental product

(ii) Prime implicant.

(c) Show that xz^1 is prime implicant of :

$$xy^1 + xyz^1 + x^1yz^1.$$

UNIT—4

7. (a) Find inverse of matrix :

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

(b) If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ prove that $A^2 - 4A - 5I = 0$.

8. (a) Express $A = \begin{bmatrix} 4 & 2 & -3 \\ 1 & 3 & -6 \\ -5 & 0 & -7 \end{bmatrix}$ as a sum of symmetric and skew-symmetric matrix.

(b) Find rank $A = \begin{bmatrix} 2 & 3 & 5 \\ 4 & 6 & 10 \\ -8 & -12 & -20 \end{bmatrix}$.