

Exam. Code : 105701

Subject Code : 1444

B.Sc. Information Technology 1<sup>st</sup> Semester

APPLIED & DISCRETE MATHEMATICS

Paper—III

Time Allowed—Three Hours] [Maximum Marks—75

**Note** :—Attempt **FIVE** questions selecting at least **ONE** question from each section and the **fifth** question may be attempted from any section. All questions carry equal marks.

**SECTION—A**

1. (a) If  $A = [4, 5, 8, 12]$ ,  $B = [1, 4, 6, 9]$ ,  $C = [1, 2, 3, 4]$  find  $A - (B - A)$  and  $A - (C - B)$ .

(b)  $A = [2, 3, 4, 5, 6]$ ,  $B = [3, 5, 7, 9]$ ,  $C = [1, 2, 3, 4]$  show  $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$ .

7.5+7.5=15

2. (a) In a group of students, 100 students know Hindi, 50 know English and 25 know both. Each of students knows either Hindi or English. How many students are there in a group ?

(b) Let  $A = \left[ \frac{1}{2}, 2 \right]$ ,  $B = [2, 3, 5]$ ,  $C = [-1, -2]$  verify

that  $A \times (B - C) = (A \times B) - (A \times C)$ .

7.5+7.5 = 15

**SECTION—B**

3. (a) Using truth table prove that :

$$p \vee (q \wedge r) \equiv (p \vee q) \wedge (p \vee r).$$

(b) Test the validity of following argument using truth table. If it rain then crop will be good. It did not rain, therefore crop will not be good.

7.5+7.5=15

4. (a) Define :

- (i) Conditional connector
- (ii) Bi conditional connector
- (iii) NAND connector
- (iv) NOR connector
- (v) XOR connector.

(b) Prove that :

$$(p \leftrightarrow q) \leftrightarrow r \equiv p \leftrightarrow (q \leftrightarrow r)$$

7.5+7.5=15

**SECTION—C**

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

(b) Simplify Boolean expression :

$$xyz + x'z' + xyz' + x'y'z + x'yz'$$

7.5+7.5=15

6. (a) Minimize the function :

$$p(A, B, C) = \Sigma m(0, 3, 5, 6, 7) + d(2, 4)$$

- (b) Prove that :

$$(A + B)(\bar{A} + C) = AC + \bar{A}B \quad 7.5+7.5=15$$

### SECTION—D

7. (a) Find rank  $A = \begin{bmatrix} 3 & 4 & 12 \\ 9 & 12 & 15 \\ -6 & -8 & -10 \end{bmatrix}$ .

(b) Find inverse of matrix  $A = \begin{bmatrix} 1 & 3 & 3 \\ 1 & 4 & 3 \\ 1 & 3 & 4 \end{bmatrix}$ .

$$7.5+7.5=15$$

8. (a) If  $A = \begin{bmatrix} 1 & 1 & -1 \\ 3 & 0 & 3 \\ 4 & 5 & 0 \end{bmatrix}$ ,  $B = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 0 & 1 & 3 \end{bmatrix}$

verify that  $(AB)' = B'A'$ .

- (b) Let  $f(x) = x^2 - 5x + 6$  find  $f(A)$  if

$$A = \begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}. \quad 7.5+7.5=15$$