Bachelor of Computer Application (B.C.A.) Semester—II (C.B.S.) Examination

DISCRETE MATHEMATICS—II

Paper—IV

Time : Three Hours] [Maximum Marks : 50

N.B. :— (1) **ALL** questions are compulsory and carry equal marks.

(2) Draw neat and labelled diagram wherever necessary.

EITHER

1. (a) Give the power set of following :

(i) $\{\phi, 1\}$

(ii) $\{a, b, c\}$ 5

(b) Show that for any two finite and non-empty sets A and B;

$A - (A \cap B) = A - B$. 5

OR

(c) What do you mean by symmetric difference ? Explain with example. Also draw the Venn diagram. 5

(d) Let A = {a, b, c, d}. Let R be the relation on A, that has the matrix :

$$M_R = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 1 & 1 & 1 & 0 \\ 0 & 1 & 0 & 1 \end{bmatrix}$$

construct the diagraph of R and list the in-degree and out-degree of all vertices. 5

EITHER

2. (a) Prove by mathematical induction :

$1 + 2 + 3 + ... + n = n(n + 1)/2$. 5

(b) Explain Pigeon-hole principle. 5

OR

(c) What do you mean by function ? Also explain the following functions :

(i) One to one

(ii) Onto

(iii) Inverse function. 5

(d) Find an explicit formula for the sequence defined by $C_n = 3C_{n-1} - 2C_{n-2}$ with initial conditions $C_1 = 5$ and $C_2 = 3$. 5

EITHER

3. (a) For Boolean Polynomial $P(x, y, z) = (x \wedge y) \vee (y \wedge z')$. Construct the truth table and show the Polynomial by logic diagram. 5

(b) Let S = {a, b, c} and A = P(S). Draw the Hasse diagram of the Poset with partial ordering of set inclusion. 5

OR

(c) Let L be a bounded distribution lattice. Prove that if complement of a ε L exists, then it is unique. 5

(d) Let G be the set of all non-zero real numbers and let $a * b = \frac{ab}{2}$; show that (G, $*$) is an abelian group. 5

EITHER

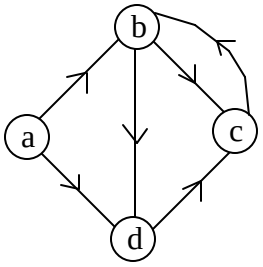
4. (a) Explain the following :
   (i) labelled tree
   (ii) undirected tree. 5

   (b) Let number of edges of graph G be m, then prove that G has a Hamiltonian circuit, if $m \geq \frac{1}{2}(n^2 - 3n + 6)$, where n is the number of vertices. 5

OR

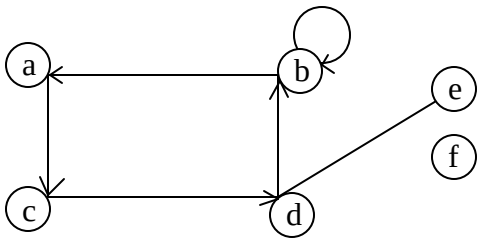
   (c) Explain with the help of example :
   (i) directed graph
   (ii) null graph
   (iii) complete graph
   (iv) linear graph
   (v) weighted graph. 5

   (d) Obtain the adjancy matrix of the diagraph given below.



5

5. Attempt **ALL** :
   (a) What are the properties of binary relation ? Explain. 2½
   (b) How many words can be made by using the letters of the word "BANANA", taken all at a time ? 2½
   (c) For the following graph; find :
   (i) vertex set
   (ii) edge set
   (iii) pendent vertex
   (iv) loop
   (v) isolated vertex.



2½

   (d) Define :
   (i) Distributive lattice.
   (ii) Complemented lattice. 2½