

Bachelor of Science (B.Sc. I.T.) Semester—II (C.B.S.) Examination
APPLIED MATHEMATICS—II
Paper—VI

Time : Three Hours]

[Maximum Marks : 50

- N.B. :—** (1) **ALL** questions are compulsory and carry equal marks.
 (2) Assume the data wherever necessary.
 (3) Draw neat and labelled diagram wherever necessary.

EITHER

1. (a) What is Binary relation ? Explain the properties of binary relation. 5
 (b) Let $U = \{a, b, c, d, e, f, g, h, k\}$. $A = \{a, b, c, g\}$, $B = \{d, e, f, g\}$, $C = \{a, c, f\}$ and $D = \{f, h, k\}$
 Compute :—
 (A) $A \cup B$
 (B) $A - B$
 (C) A
 (D) $A \oplus B$
 (E) $A \cap C$. 5

OR

- (c) Let $A = \{a, b, c, d\}$. Let R be the relation on A , that has the matrix. $M_R = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 \end{bmatrix}$; construct
 the diagraph of R and list the indegree and outdegree of all vertices. 5
 (d) What do you mean by symmetric difference ? Explain with example and also draw the Venn diagram for it. 5

EITHER

2. (a) By mathematical induction prove that $p(n) : \left(\bigcup_{i=1}^n A_i \right) = \bigcap_{i=1}^n \overline{A_i}$. 5
 (b) What do you mean by function ? Explain the various types of functions. 5

OR

- (c) Find an explicit formula for the sequence defined by $C_n = 3 C_{n-1} - 2 C_{n-2}$ with initial conditions $C_1 = 5$ and $C_2 = 3$. 5
- (d) Prove that, if n pigeons are assigned to m pigeon holes, and $m < n$, then at least one pigeon hole contains two or more pigeons. 5

EITHER

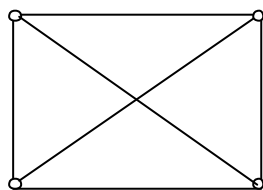
3. (a) Let L be a bounded distributive lattice. Prove that, if complement of $a \in L$ exists, then it is unique. 5
- (b) Let σ be the set of all non-zero real numbers and let $a * b = \frac{ab}{2}$; show that $(\sigma, *)$ is an abelian group. 5

OR

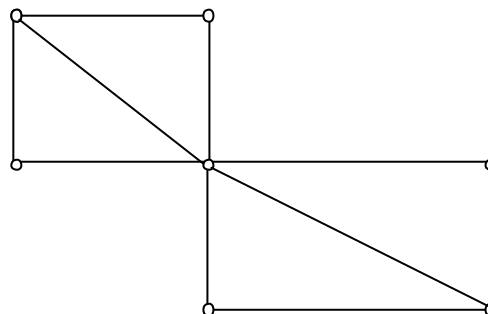
- (c) Let $S = \{X, Y, Z\}$ and $A = P(S)$. Draw the Hasse diagram of the PO set with partial ordering of set inclusion as the relation. 5
- (d) For Boolean Polynomial, $P(x, y, z) = (x \wedge y) \vee (y \wedge z')$ construct the truth table and draw/show the polynomial by logic diagram. 5

EITHER

4. (a) How will you represent graph in memory ? Explain with example. 5
- (b) Which of the following graphs in figure a and b have an Euler circuit or Euler path but not an Euler circuit or neither ? Explain reason.



(a)



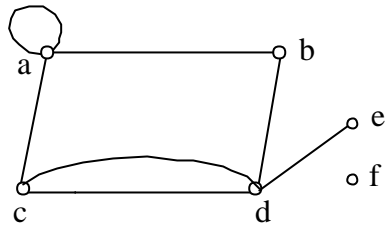
(b)

OR

- (c) What do you mean by tree ? Explain the following in tree, with example :—
- (i) level
 - (ii) height
 - (iii) sibling
 - (iv) ancestor
 - (v) descendents.

5

(d) Determine the following on given graph.



- (i) Vertex set
- (ii) Pendent Vertex
- (iii) Isolated vertex.
- (iv) adjacent vertices
- (v) loop.

5

5. Attempt **ALL** :—

(a) If $A = \{1, 2, 3, 4\}$, $B = \{a, b, c\}$ find $A \times B = ?$ 2½

(b) How many words can be made by using the letters of the word “COMPUTER”, taken all at a time ? 2½

(c) Define :—

- (i) Distributive lattice
- (ii) Complemented lattice. 2½

(d) Explain the following :—

- (i) Path
- (ii) Euler Path
- (iii) Hamiltonian Path. 2½