

MR-102

May-2022

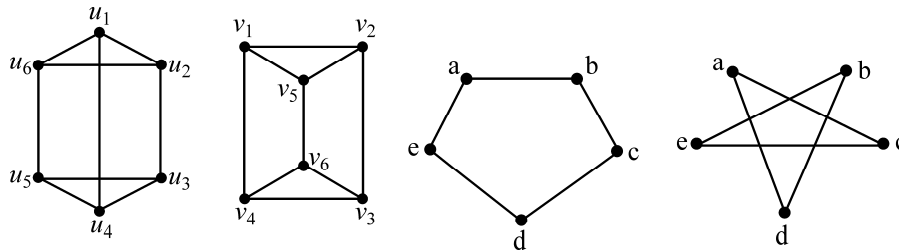
B.C.A., Sem.-II**CC-111 : Discrete Mathematics****(New Course)****Time : 2 Hours]****[Max. Marks : 50**

- Instructions :** (1) All Questions in Section – I carry equal marks.
 (2) Attempt any **Two** questions in Section – I.
 (3) Question **5** in Section – II is Compulsory.

SECTION – I

1. (A) Define Group. Show that the set of all positive rational numbers forms an abelian group under the composition defined by $a * b = \frac{ab}{2}$. **10**
- (B) Define an Even and Odd permutations. Check whether the following permutations are even or odd. Also find the composition of these permutations. **10**
- $$f = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 1 & 4 & 3 \end{pmatrix} \text{ and } g = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 2 & 1 & 4 \end{pmatrix}$$
2. (A) Define Relation. Let $X = \{1, 2, 3, 4\}$ and $R = \{(x, y) / x > y\}$. Find Relation. Also give Relation matrix and draw its graph. **10**
- (B) Draw the Hasse diagram of $\langle S_{36}, D \rangle, \langle S_{72}, D \rangle$ **10**
3. (A) Define Lattice and Boolean Algebra. Show that $\langle S_{30}, D \rangle$ is a complemented lattice. Is $\langle S_{30}, D \rangle$ is a Boolean algebra or not? Give reason. **10**
- (B) Find Sum of Products canonical form of the following Boolean expressions in three variables x_1, x_2, x_3 . **10**
- $$x_1 + x_2, x_1 + (x_2 * x_3'), (x_1 + x_2)' + (x_1' * x_3)$$

4. (A) Define Isomorphic graphs. Show that following pairs of graphs are isomorphic or not. 10



- (B) Define Strongly connected, unilaterally connected and weakly connected graphs with example. Also explain Strong component; unilateral component and weak components of graphs. 10

SECTION – II

5. Attempt following : (Any Five) 10

- (1) In a Group $(G, *)$; $a * e = e * a =$ _____.
 - (a) a
 - (b) e
 - (c) ae
 - (d) none
- (2) An Abelian Group is also called commutative group.
 - (a) True
 - (b) False
- (3) A Graph $G = (V, E)$ is called empty if _____.
 - (a) Its vertex set is empty
 - (b) Its edge set is empty
 - (c) Both vertex set and edge set empty
 - (d) None
- (4) In a graph sum of degrees of all the vertices is _____.
 - (a) $2e$
 - (b) e^2
 - (c) e
 - (d) None
- (5) A transposition is a cycle of length _____.
 - (a) 3
 - (b) 4
 - (c) 1
 - (d) 2
- (6) A relation is called equivalence if it is _____.
 - (a) reflexive
 - (b) symmetric
 - (c) transitive
 - (d) All

