

SHAMBHUNATH INSTITUTE OF ENGINEERING AND TECHNOLOGY, PRAYAGRAJ

Subject Code: BCS-303

Subject: Discrete Structure & Theory of Logic

Course: B.Tech

SEMESTER: 3rd

FIRST SESSIONAL EXAMINATION, ODD SEMESTER, (2023-2024)

Branch: COMPUTER SCIENCE & ENGINEERING

Time – 1 Hr. & 30 Min.

Maximum Marks – 30

NOTE : (Attempt All Sections)

1. Attempt any FIVE of the following.

| QN | QUESTION | Marks | CO | BL |
|----|---|-------|-----|----|
| a. | Discuss Equal and Disjoint set with example. | 2 | CO1 | L3 |
| b. | What is symmetric difference? | 2 | CO1 | L1 |
| c. | Let R be relation given by on set $A = \{1, 2, 3\}$. $R = \{(1, 2), (2, 3), (3, 1)\}$. Find the Reflexive, Symmetric and Transitive closure of R. | 2 | CO1 | L2 |
| d. | Let R be a relation on set A with cardinality n. write down the number of reflexive and symmetric relation on set A. | 2 | CO1 | L2 |
| e. | Let $A = \{1, 2, 3, 4, 6, 8, 9, 12, 18, 24\}$ be ordered by the relation 'a divides b'. Find the Hasse diagram. | 2 | CO1 | L3 |
| f. | Define complemented lattice. | 2 | CO1 | L1 |

2. Attempt Any ONE of the following.

| QN | QUESTION | Marks | CO | BL |
|----|---|-------|-----|----|
| a. | Identify whether the each of the following relation defined on the set $X = \{1, 2, 3, 4\}$ are Reflexive, Symmetric and Transitive Relation. $R_1 = \{(1, 1), (1, 2), (2, 1)\}$. $R_2 = \{(1, 1), (1, 2), (1, 4), (2, 1), (2, 2), (3, 3), (4, 1), (4, 4)\}$. $R_3 = \{(2, 1), (3, 1), (3, 2), (4, 1), (4, 2), (4, 3)\}$. | 5 | CO1 | L3 |
| b. | Let $X = \{1, 2, 3, \dots, 7\}$ and $R = \{(x, y) (x-y) \text{ is divisible by } 3\}$. Is R equivalence relation. | 5 | CO1 | L3 |
| c. | Let (L, V, \wedge, \leq) be a distributive lattice and $a, b \in L$. If $a \wedge b = a \wedge c$ and $a \vee b = a \vee c$ then show that $b = c$ | 5 | CO1 | L5 |

3. Attempt Any FIVE of the following.

| QN | QUESTION | Marks | CO | BL |
|----|---|-------|-----|----|
| a. | Check whether the function $f(x)=x^2-1$ is injective or not for $f:R \rightarrow R$. | 2 | CO2 | L2 |
| b. | Find the composite mapping fog and gof, if $f(x)=x^2-1$ and $g(x)=3x-1$ | 2 | CO2 | L3 |
| c. | What is recursively defined function. | 2 | CO2 | L1 |
| d. | What are Universal Gates? | 2 | CO2 | L1 |
| e. | What is Boolean algebra? | 2 | CO2 | L1 |
| f. | Simplify the following Boolean function using K-map: $F(x, y, z) = \sum (0, 2, 7)$. | 2 | CO2 | L3 |

4. Attempt Any ONE of the following.

| QN | QUESTION | Marks | CO | BL |
|----|---|-------|-----|----|
| a. | Explain different types of function with suitable diagram. | 5 | CO2 | L2 |
| b. | Justify that "If $f:A \rightarrow B$ and $g:B \rightarrow C$ be one-to-one onto functions, then gof is also one-to-one onto function and $(gof)^{-1} = f^{-1}og^{-1}$ " | 5 | CO2 | L4 |
| c. | Simplify the following function $F(A,B,C,D)=\sum(0,2,5,7,8,10,13,15)$. Also draw the logic circuit of simplified F. | 5 | CO2 | L3 |

Bloom's Taxonomy Level (BL): -

Remember (L1), Understanding (L2), Apply (L3), Analyze (L4), Evaluating (L5), Creating (L6)

CO -Course Outcome