

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
MCA - SEMESTER- I • EXAMINATION – SUMMER - 2019

Subject Code: 2610003

Date: 16/05/2019

Subject Name: Discrete Mathematics for Computer Science

Time: 02.30 PM TO 05.00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a) (1)** Test the validity of the following logical consequences. **03**
All dogs fetch.
Ketty does not fetch.
Therefore Ketty is not a dog.
- (2)** Let $X = \{1, 2, 3, 4\}$ and
 $R = \{(1, 1), (1, 4), (4, 1), (4, 4), (2, 2), (2, 3), (3, 2), (3, 3)\}$
- (i)** Write properties of R. **02**
(ii) Sketch the graph of R. From the graph, write partition of R. **02**
- (b) 1.** Briefly discuss the following terms: **02**
i) modus ponens
ii) hypothetical syllogisms
- 2.** Explain Isomorphic graphs with example. **04**
3. Write negation of following statement: **01**
This flower is not beautiful.
- Q.2 (a)** Prove that every cyclic group is abelian, but converse is not true. **07**
(b) Define Equivalence Relation with example. **07**
- OR**
- (b) 1.** Define Join Irreducible elements and Atoms with proper example. **04**
2. Define Meet Irreducible elements and Anti-atoms with proper example. **03**
- Q.3 (a)** Define Complemented Lattice. Find the complement of $\langle S_{10}, D \rangle$. **07**
(b) Prove that $\langle S_{66}, D \rangle$ is a Boolean algebra. **07**
- OR**
- Q.3 (a)** Define: Sub-Lattice. Show that S_6 is sub lattice of lattice $\langle S_{30}, D \rangle$. **07**
(b) Find a minimal sum-of-product form using K-map **07**
(i) $\alpha(x, y, z) = xyz + xyz' + x'yz' + x'y'z$
(ii) $\alpha(x, y, z) = xyz + xyz' + xy'z + x'y'z + x'y'z$
- Q.4 (a)** Define poset. When is a poset said to be a lattice? Draw Hasse diagrams of following posets and examine which of them are lattices. **07**
(a) $\langle P(S), \subseteq \rangle$ where $S = \{a, b, c\}$
(b) $\langle \{1, 2, 3, 12, 18\}, D \rangle$
(c) $\langle \{1, 2, 3, 6\}, D \rangle$
(d) $\langle S_{16}, D \rangle$.
- (b)** Give an indirect proof to show that if $n^2 + 3$ is odd, then n is even. **07**
- OR**
- Q.4 (a)** Draw Hasse diagram of following Posets. **07**
(1) $\langle S_{60}, D \rangle$ **(2)** $\langle S_4 \times S_3, D \rangle$
- (b)** For a Boolean Algebra $\langle B, *, \oplus, 0, 1 \rangle$ prove that **07**
 $(a \oplus b') * (b \oplus c') * (c \oplus a') = (a' \oplus b) * (b' \oplus c) * (c' \oplus a)$

- Q.5 (a)** 1. Prove without constructing the truth table that $\sim p \rightarrow (p \rightarrow q)$ **02**
2. Explain biimplication with example. **02**
3. Let $P(x,y)$ denote the sentence: $2x + y = 1$. What are the truth values of $\forall x \exists y P(x,y)$, $\forall x \forall y P(x,y)$, and $\exists x \exists y P(x,y)$, where the domain of x,y is the set of all integers? **03**
- (b)** (1) Define weakly connected, unilaterally connected and strongly connected Graphs. **03**
(2) Discuss directed tree with example. **04**

OR

- Q.5 (a)** Define diagraph, Cyclic graph and Null graph with example. **07**
(b) Define Node Base. Find the Node Base for the following graph. **07**
