

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

## GUJARAT TECHNOLOGICAL UNIVERSITY

MCA – SEMESTER-III EXAMINATION –SUMMER-2020

Subject Code:4639301

Date:04-11-2020

Subject Name:Basic Mathematics

Time:10:30 AM to 01:00 PM

Total Marks: 70

Instructions:

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

**Q1. a)** Give the definition of the following terms: **07**

- 1) Transpose of a matrix.
- 2) Complement of two sets.
- 3) Domain
- 4) Adjacent nodes
- 5) Reflexive relation
- 6) Complete graph
- 7) M-ary tree

**b)** Let A, B, C, and D be subsets of the set U. Draw the Venn diagram of the following sets. **07**

- a.  $(A \cup B) \cap C$    b.  $(A \cap B)'$    c.  $A \Delta B$    d.  $(A \cup B) - (A \cap B)$

**Q2. a)** Prove distributive laws in propositional logic. **07**

**b)** Construct the truth table for each of the following statement formulas. **07**

- a.  $(\sim p \vee q) \wedge p$    b.  $\sim(p \wedge q) \leftrightarrow (\sim p) \vee (\sim q)$    c.  $(\sim p \wedge q) \rightarrow p$

**OR**

**b)** What is Recursive function? Write a recursive algorithm to find out Fibonacci series. **07**

**Q3. a)** **07**

$$\text{Let } A = \begin{bmatrix} 0 & 0 & 1 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \end{bmatrix} \quad \text{and } B = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

Compute,  $A \vee B$ ,  $A \wedge B$ ,  $A^T$ ,  $B^T$ ,  $A \odot B$

**b)** Prove Bi-Implications and Contradiction Theorems. **07**

**OR**

**Q3. a)** **07**

$$\text{Let } A = \begin{bmatrix} 2 & 3 & 4 \\ 4 & 7 & 0 \\ 1 & 6 & -9 \end{bmatrix}, B = \begin{bmatrix} 3 & -4 \\ 0 & 3 \\ -2 & 7 \end{bmatrix}, \text{ and } C = \begin{bmatrix} 3 & 1 \\ 0 & 6 \\ -6 & 4 \end{bmatrix} \text{ be matrices.}$$

Verify that  $A(B+C) = AB + AC$ .

**b)** i) What is relation? Give the properties of relation with suitable example. **04**

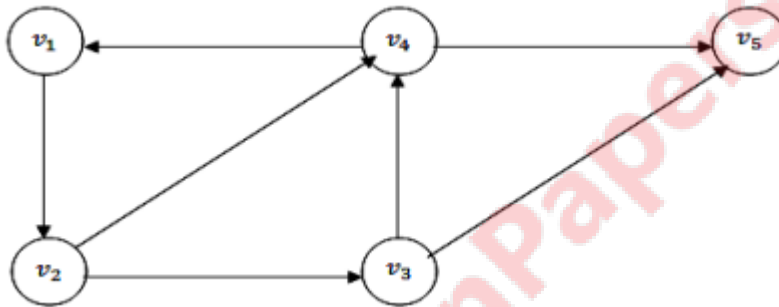
ii) Define first and second principle of mathematical induction. **03**

- Q4. a)** Let  $a, b$  and  $c$  be integers. Then prove **07**
1.  $b + a = c + a \Rightarrow b = c.$
  2.  $a + b = a + c \Rightarrow b = c.$
- b)**
- i) Prove the theorem greatest common divisors. **04**
  - ii) Give the power set of following. **03**
- $S = \{ 1, 2, \{ 6, 7 \} \}$  ,  $Q = \{ a, \{ 1, 3 \}, b \}$

**OR**

- Q4. a)**
- i) What is identity function and constant function. **04**
  - ii) Give the definition of floor function, cardinality and ceiling function. **03**
- b)** Let  $A = \{1, 2, 3, 4, 5\}$  ,  $B = \{a, b, c, d\}$  and  $f: A \rightarrow B$  be defined by  $f(1) = a, f(2) = a, f(3) = b, f(4) = c, f(5) = d$ . Draw arrow diagram of  $f$  and  $f^{-1}$ . **07**

- Q5. a)** Define strong, unilateral, Weak component. Also find strong, unilateral, Weak component from the given graph. **07**



- b)** Define isomorphic graph and also define matrix representation of graph. **07**

**OR**

- Q5. a)** Define Tree. **07**  
 Give three different representation of the given tree.  
 $(v_0(v_1(v_2)(v_3)(v_4))(v_5(v_6)(v_7)(v_8)(v_9))(v_{10}(v_{11})(v_{12})))$ .
- b)** Explain traversal of binary tree with example. **07**

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