

**CODE: 17CF00101**

MCA I Year I Semester Regular Examinations, December 2017  
**MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE**

Time: 3 hours

Max Marks: 60

Answer all **five** units. (5 x 12 = 60 Marks)

**UNIT-I**

1. a) Explain basic Properties of Sets.  
b) Briefly discuss different properties of binary relations by taking an example.

OR

2. a) Explain inclusion exclusion principle.  
b) Write the truth tables for Conditional and the Biconditional logic.

**UNIT-II**

3. a) State Lagrange's Theorem and derive the proof of Lagrange's Theorem  
b) Differentiate between isomorphism Group and automorphism Group

OR

4. a) State and explain burnsides's theorem  
b) Briefly discuss the features of homomorphism in groups

**UNIT-III**

5. a) Briefly discuss the rules of sum and products in elements of discrete mathematics.  
b) Explain the concept of total solution of the difference equation

OR

6. a) Three dice were rolled, given that no two faces were the same, what is the probability that there was an ace?(Let A denotes event that there was an ace and B denotes event that no two faces were the same)  
b) Explain the concept of linear recurrence relations with constant coefficients by taking an example.

**UNIT-IV**

7. a) Explain the concept of digraphs representing different relations  
b) Discuss the proof for the following theorem "In a graph with n vertices, if there is path from vertex v1 to vertex v2, then there is a path of no more than n-1 edges from vertex v1 to vertex v2"

OR

8. a) Explain the concept of adjacency list in linked list representations.  
b) Write the flow chart for breadth-first search graph traversal technique.

**UNIT-V**

9. a) Illustrate the formation of a binary search tree for the words mathematics, physics, geography, zoology, meteorology, geology, psychology, and chemistry (using alphabetical order).  
b) Write brief note on prefix codes.

OR

10. a) Briefly discuss the properties of a binary search tree.  
b) Construct the minimum spanning tree using Prim's algorithm.