

S-2/2110

10784/NK

Discrete Mathematics - P-211  
SEM-3rd

MM 60

Time 3 Hrs

Note: Attempt any four questions. All questions carries equal marks

1. If  $A=\{1,2,3,4,5\}$   $B=\{3,4,5,6,7\}$   $C=\{2,4,6,8\}$  and  $U=\{1,2,3,4,5,6,7,8\}$  then verify

a)  $(A \cup B) \cap C = A \cup (B \cap C)$

b)  $(A - B) \neq (B - A)$

c)  $A \cap B = B \cap A$

d)  $(A \cup B)^c = A^c \cap B^c$

2. What is a Relation? Define the relations: a) Reflexive b) Symmetric c) Transitive. Let R be the relation on a set  $A=\{1,2,3,4\}$  defined by  $R=\{(1,2),(2,1),(2,3),(1,3),(3,4),(4,2), (1,1), (2,2), (3,3),(4,4)\}$ .

Check whether the relation is reflexive, symmetric, and Transitive.

3. a) What is a bijection? Prove that identity map is always a bijection.

b) If  $f(x)=2x+5$ ,  $g(x)=3x^2+7$ . Check whether  $f \circ g = g \circ f$ ?

4. State and Prove De Morgan's Law for sets.

5. Explain using suitable examples a) Planar Graph b) Euler Path c) Hamiltonian Circuit d) Minimal Spanning Tree d) Inorder Tree Traversal

6. Find the independent term in the expansion of

$$\left(\frac{2x}{3} - \frac{4}{x}\right)^{10}$$

7. Prove that a tree with n vertices has n-1 edges.

8. Solve the following recurrence relation:

$$S(n) - 4S(n-1) + 3S(n-2) = 0 \quad \text{given } S(0)=3 \text{ and } S(1)=5$$

9.

I. If  $A=\{1,2,3\}$  and  $B=\{a,b\}$  Find  $A \times B$  and  $B \times A$ .

II. What is Partial Order Relation?

III. What is Function?

IV. Define Simple Graph and Complete Graph.

V. Define Equivalence Class.

VI. Find all subsets of  $\{a,b,c\}$ VII. Draw Pascal's Triangle for  $n=6$ .VIII. Using Binomial Theorem find the value of  $(99)^3$ 

IX. Define Group.

X. What do you mean by Homomorphism?

XI. In how many ways letters of word PATIALA can be arranged?

XII. A man has 6 friends. In how many ways he can invite one or more of them to a party?