C-2110

8522/NH

Time: -3 hrs

M. M. 40

Discrete Mathematics-I

[redacted]

Note: - Candidates are required to Attempt five questions in all selecting not more than two questions from each Section-A and B and Section-C is compulsory.

Section-A **12 marks**

Q1:- (a) In a town of 10,000 families, it was found that 40% families buy newspaper A, 20% buy newspaper B and 10% buy newspaper C. 5% buy A and B, 3% buy B and C and 4% buy A and C. if 2% families buy all the newspapers, find the number of families which buy (i) A only (ii) B only (iii) none of A, B and C.

Q2:- Prove that the function $f: C \to R$, defined by $f(z) = |z|$ is neither one-one nor onto.

Q3:- (a) Define Partially ordered set. Draw the Hasse diagram of D_{30}.

(b) Show that lattice with three or fewer elements is a chain.

Q4:- (a) The number of diagonals of a polygon is 20. Find the number of its sides.

(b) In how many ways can 5 boys and 5 girls be seated at a round table, so that no two girls sit together?

Section-B **12 marks**

Q5:- (a) Can a graph with seven vertices be isomorphic to its complement? Justify?

(b) A graph G has 21 edges, 3 vertices of degree 4 and all other vertices are of degree 3. Find the number of vertices in G.

Q6:- Define Planner Graph. Prove that if G is a simple, connected planner graph with more than one edge, then $(i) 2e \geq 3r, (ii) e \leq 3v - 6$.

Q7:- (a) State and prove Euler's formula.

(b) Give an example of connected graph that has (i) Euler circuit but not Hamiltonian circuit, (ii) both Hamiltonian and Euler.

Q8:- Define Tree. Prove that a graph G is a tree iff there is one and only one path between every pair of vertices.

Section-C **16 marks**

Q9: (a) Define Totally ordered set.

(b) Show that if 9 colors are used to paint 1000 houses, at least 112 houses will be of same color?

(c) Define relation.

(d) Define Partitions.

(e) Define Closed Path.

(f) State Travelling Salesman Problem.

(g) Define Minimal Spanning Tree.

(h) Define Finite State machine.