**D 2691**

**(2 Pages)** **Name**.....

**Reg. No**.....

# FIRST SEMESTER M.Sc. DEGREE EXAMINATION, JANUARY 2005

## Computer Science

## CS 102—DISCRETE MATHEMATICS

Time : Three Hours Maximum : 60 Marks

*Answer any* five *questions from Part A and any* **three** *questions from Part B.*

### Part A

1. Write the truth table for the following

   (a) $(P \wedge Q) \vee (\neg P \wedge$

   (b) $Q \vee (\neg P \vee Q)$.

   (c) $P \wedge \neg Q) \vee (P \vee Q)$.

2. Prove that the following are tautologies :—

   (a) P (Q P).

   (b) $[(A \cap B) \vee (B \cap C) \vee (C \cap A)] \Leftrightarrow [(A \vee B) \wedge (B \vee \neg\neg \vee (C \vee A)]$.

3. Obtain equivalent conjunctive and disjunctive normal form for $RP \quad \vee R] \wedge (P \rightarrow$

4. Define Variables and Quantifiers.

5. Distinguish between Incidence matrix and Adjacency matrix.

6. Define the following terms :—

   (a) Paths and walks.

   (b) Weighted graph.

7. Solve $u - 4u_{r-1} + 4u_{r-2} = 3_{x+2}x$.

(5 x 3 = 15 marks)

### Part B

1. (a) Define a Proposition. Verify that the proposition $(p \wedge q) \wedge 7 (p \vee q)$ *is* a contradiction.

   (b) Obtain the principal conjunctive normal form of $(P \wedge Q) \vee \neg P \vee Q \vee R)$.

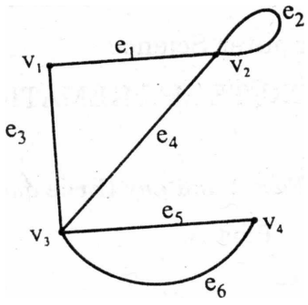
2. (a) Show that $P(x) \cap Q(x) \Rightarrow (3x)(P(x) \cap Q(x))$.

   (b) Explain the indirect method of proof.

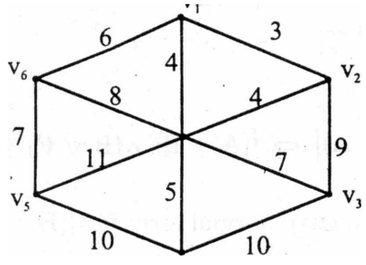
**Turn over**

3. (a) Prove that a finite tree with at least one edge has at least two vertices of degree 1.

(b) Find the adjacency matrix for the following graph in Fig. 1 :-




4. (a) Find the minimal spanning tree by Prim's algorithm and Kruskal's algorithm in Fig. 2.




(b) Define acyclic directed graph.

(3 x 15 = 45 marks)