9204/A21

OCTOBER 2010

DISCRETE MATHEMATICS

Time : Three hours — Maximum : 100 marks

PART A — ($6 \times 5 = 30$ marks)

Answer any SIX questions.

1. Define binary relation and give two examples.

2. Write the properties of functions with examples.

3. Define tautology and contradiction.

4. Construct truth table for $(P \wedge Q) \vee (\neg P \wedge \neg Q)$.

5. Explain the problem to tower of Hanoi.

6. Write any two applications of recurrence relations.

7. Define sub graph with example.

8. Prove that in a simple graph, the number of odd degree vertices is always even.

9. Define least upper bound and greatest lower bound with example.

10. Define modular lattice with example.

PART B — ($4 \times 10 = 40$ marks)

Answer any FOUR questions.

11. Define equivalence relation and give an example.

12. Construct truth table for the formula :

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

13. Explain the four types of normal forms with example.

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

15. Explain any two type of matrix representation of graphs.

16. Prove that every chain is a distributive lattices.

PART C — ($2 \times 15 = 30$ marks)

Answer any TWO questions.

17. (a) Let $R = \{(x, 2x / x \in I)\}$ and $S = \{(x, 7x / x \in I)\}$ find $R \circ S, S \circ R, R \circ R, R \circ S \circ R, S \circ R \circ S, R \circ R \circ R$.

(b) Define recursion with example.

18. (a) Prove that $(\exists x) M(x)$ follows logically from the premises $(x)\ (H(x) \rightarrow M(x))$ and $(\exists x) H(x)$.

(b) Explain travelling salesman problem.

19. Explain the applications of Boolean algebra to switching theory.