BCA II year

7210/A21 **OCTOBER 2008**

DISCRETE MATHEMATICS

Time : Three hours Maximum : 100 marks

PART A — ($6 \times 5 = 30$ marks)

Answer any SIX questions.

1. Write the properties of a relation.

2. Show that $f(x, y) = x^y$ is a primitive recursive function.

3. What is the disjunctive normal form of $pn\ (P \to Q)$?

4. Symbolise "X is the father of the mother of Y".

5. Write any two applications of recurrence relations.

6. Write the algorithm for solving Non-homogeneous finite order liner relation.

7. Define Rooted binary tree, spanning tree, weighted graph.

8. Write PRIM'S algorithm

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9. Explain duality in lattices with example.

10. Write a short note on boolean functions.

PART B — $(4 \times 10 = 40$ marks$)$

Answer any FOUR questions.

11. Let $R = \{(1, 2), (3, 4), (2, 2)\}$ and

$S = \{(4, 2), (2, 5), (3, 1), (1, 3)\}$ find

RoS, SoR, RoR, SoS, RoSoR.

12. Show that $P \rightarrow (Q \rightarrow R) \Leftrightarrow P \rightarrow (\urcorner Q \vee R) \Leftrightarrow (P \wedge Q) \rightarrow R$ without using truth table.

13. Show that $(\exists x)\, m(x)$ follows logically from the premises $(x)\,[H(x) \rightarrow M(x)]$ and $(\exists x) H(x)$.

14. Solve the recurrence relation

$a(n) = a(n-1) + 2\,(n-1),\ a(1) = 2$.

15. Prove that a graph is a tree iff it is minimally connected.

16. State and prove distributive inequalities of a lattice.

PART C — $(2 \times 15 = 30$ marks$)$

Answer any TWO questions.

17. (a) Explain Warshall's algorithm.

(b) Explain all the four normal forms with examples.

18. (a) Solve $S(k) + 5S(k-1) = 9,\ S(0) = 6$ in all categories.

(b) Explain travelling salesmen problem.

19. Construct the logic circuit for

$f(x_1, x_2, x_3) 0 = [(x_1 \wedge x_2) \vee x_3] \wedge [(x_2 \vee x_3) \vee x_3]$

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