15091

M.Sc. DEGREE EXAMINATION, OCTOBER/NOVEMBER 2018.

FIRST SEMESTER

Computer Science

Paper I — DISCRETE MATHEMATICAL STRUCTURES

Time : Three hours Maximum : 75 marks

(No additional sheet will be supplied)

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PART A — (5 × 3 = 15 marks)

Answer any FIVE questions.

Each question carries 3 marks.

Each answer should not exceed 1 page.

1. Show that $\sim (p \vee q)$ and $\sim p \wedge \sim q$ is logically equivalent.

2. Describe the growth of functions.

3. Write short notes on Binomial Coefficients.

4. Represent the following Relation on {1, 2, 3, 4} with a matrix.

   {(1, 2), (1, 3), (1, 4), (2, 3), (2, 4), (3, 4)}

   {(1, 1), (1, 4), (2, 2), (3, 3), (4, 1)).

5. Show that $K_4$ and $Q_3$ are planar.

6. Define path, circuit, walk with an example.

7. Give an example of preorder and post order Traversals.

8. Define Rooted Tree with an example.

PART B — (4 × 15 = 60 marks)

Answer ALL questions.

Each question carries 15 marks.

Each answer should not exceed 6 pages.

9. Show that $(p \to q) \wedge (q \to r) \to (p \to r)$ is a tautology.

Or

10. (a) Explain the applications of number theory.

(b) Find

(i) $f \circ f$,

(ii) $g \circ g$,

(iii) $f \circ g$,

(iv) $g \circ f$

where $f(x) = x^2 + 1$ and $g(x) = x + 2$ are functions from $R$ to $R$.

11. Solve the Recurrence Relation $F_{n-1} = F_{n-2} + F_{n-3}$ for $n >= 0$.

Or

12. Explain Warshal's algorithm. Find the Transitive Closure of the relation {(b, c), (b, e), (c, e), (d, a), (e, b), (e, c)}.

13. State and Prove Euler's formula.

Or

14. Explain Euler and Hamiltonian paths with proper examples.

15. Explain Prim's algorithm for finding the minimum cost spanning tree.

Or

16. Elaborate the applications of Trees.