

M.Sc. DEGREE EXAMINATION, NOVEMBER 2017.

FIRST SEMESTER

Computer Science

Paper I — DISCRETE MATHEMATICAL STRUCTURES

Time : Three hours

Maximum : 75 marks

(No additional sheet will be supplied)

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 $\sim(p \rightarrow q)$ and $p \wedge \sim q$ are logically equivalent.
2. What are the various set operations? Give example.
3. Differentiate Permutation and Combination.
4. What are the applications of Number Theory?
5. Find the Recurrence relation for the Fibonacci sequence.
6. Define Pigeonhole Principle.
7. Differentiate Regular and Complete graph with example.
8. What is Planar Graph? Give 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 the premises $P \rightarrow \sim Q$, $R \rightarrow Q$, R follows the conclusion $\sim P$.

Or

10. Find (a) $f \circ f$, (b) $g \circ g$, (c) $f \circ g$ (d) $g \circ f$. Where $f(x) = x^2 + 1$ and $g(x) = x + 2$ are functions from R to R .

11. Use Mathematical Induction to show that $1 + 2 + 2^2 + \dots + 2^n = 2^{n+1} - 1$ for all nonnegative integers 'n'.

Or

12. Show that the principle of Mathematical Induction and strong induction are equivalent.
13. Find the number of distinct permutations that can be formed from all the letters of each word (a) COMPUTER (b) SCIENCE.

Or

14. Solve the Recurrence Relation $F_{n-1} = F_{n-2} + F_{n-3}$ for $n \geq 0$.
15. State and Prove Euler's Formula.

Or

16. Explain the conditions for two graphs to be isomorphic with an example.

