

M. Sc. DEGREE EXAMINATION, NOVEMBER 2022
INFORMATION TECHNOLOGY
FIRST SEMESTER

COURSE : MAJOR CORE
PAPER : DISCRETE MATHEMATICS FOR COMPUTER SCIENCE
TIME : 3 HOURS MAX. MARKS: 100

SECTION - A

Answer ALL the questions. (10x2=20)

1. How will you represent a set?
2. What is mathematical induction and mention the techniques involved to prove statement in mathematical induction?
3. What is formal logic? Give an example.
4. Define : CNF
5. List out the types of relations.
6. What is binary relation and mention its properties.
7. State pigeon hole principle.
8. Write the statement in symbolic form "Some real numbers are rational".
9. Define complete graph.
10. If a tree has only one eccentricity, then what is the name of that tree?

SECTION - B

Answer any SIX of the following questions: (6x5=30)

11. Show that direct product of any two distributive lattices is a distributive lattice.
12. Using mathematical induction, prove that $2 + 2^2 + 2^3 + \dots + 2^n = 2^{n+1} - 2$
13. Obtain DNF of $Q \vee (P \wedge R) \wedge \neg((P \vee R) \wedge Q)$.
14. What is meant by Tautology? Without using truth table, show that $((P \vee Q) \wedge \neg(\neg P \wedge (\neg Q \vee \neg R))) \vee (\neg P \wedge \neg Q) \vee (\neg P \wedge \neg R)$ is a tautology.
15. Write short notes on two types of quantifiers with example.
16. List out the properties of Algorithm.
17. How to create an Adjacency Matrix? Give example.
18. Explain Hamiltonian cycle with an example.

SECTION - C

Answer any FIVE of the following questions: (5x10=50)

- 19 Discuss the principle of inclusion and exclusion in discrete mathematics. Give an example.

20. Show that the hypotheses,

”It is not sunny this afternoon and it is colder than yesterday,”

” We will go swimming only if it is sunny,”

“If we do not go swimming then we will take a canoe trip,” and “If we take a canoe trip, then we will be home by sunset “lead to the conclusion “we will be home by sunset”.

21. Use mathematical Induction to prove that $(3^n + 7^n - 2)$ is divisible by 8, for $n \geq 1$.

22. Discuss about relation and its special types with suitable example.

23. Prove that any two simple connected graphs with n vertices all of degree 2 are isomorphic.

24. Explain the following with suitable examples.

(i). Connected Graph

(ii). Subgraphs

(iii). Paths and Cycles

(iv). Directed Graph

25. Explain Characterization of Trees in detail.
