Turn Over

 $(10 \times 2 = 20)$

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B.Sc DEGREE (CBCS)) REGULAR/ IMPROVEMENT/ REAPPEARANCE / MERCY **CHANCE EXAMINATIONS, FEBRUARY 2025**

Fourth Semester

B.Sc Information Technology Model III

Complementary Course - MM4CMT06 - MATHEMATICS - DISCRETE MATHEMATICS

2017 Admission Onwards

79624DEB

Time: 3 Hours

QP CODE: 25019898

Part A

Answer any ten questions. Each question carries 2 marks.

- 1. Define a set.
- 2. Define the operation union on sets.
- 3. Define one to one function.
- What is partition of a set? 4.
- 5. Draw Truth Table for $(P \land Q) \land (\sim P \lor Q)$
- What are associative laws? 6.
- 7. Define disjunctive normal form.
- 8. Define universal quantifier.
- 9 Negate the following $\exists x \forall y, p(x, y)$
- 10. Define disconnected Graph.
- 11. What is Euler theorem?
- 12. Define post order.

Part B

Answer any six questions.

Each question carries 5 marks.

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Max. Marks: 80

Reg No : Name 5





- 13. Use Venn diagram to prove distributive laws.
- 14. Show that the relation 'less than' defined on N, the set of positive integers is neither an equivalance relation, nor partial order relation but it is a total order relation.
- 15. Let R be and equivalence relation on set A = $\{4,5,6,7\}$ defined by R = $\{(4,4), (5,5), (6,6), (7,7), (6,4), (4,6)\}$ determine all equivalence classes.
- 16. Prove that distributive law using truth table.
- 17. Explain Biconditional Statement.
- 18. Explain free and bound variables.
- 19. Show that $\exists x M(x)_{\text{follows logically from the premises}} \exists x (H(x) \rightarrow M(x)_{\text{and}} \exists x H(x)$
- 20. Draw flow char for Prim's algorithm.
- 21. Explain Warshall's algorithm.

(6×5=30)

Part C

Answer any **two** questions.

Each question carries **15** marks.

22. a) Prove by mathematical induction

$$1^3 + 3^3 + 2^3 + \dots + n^3 = \left[\frac{n(n+1)}{2}\right]^2$$

b)Prove by mathematical induction

$$1.2 + 2.3 + 3.4 + \dots + n.(n+1) = \frac{n(n+1)(n+2)}{3}$$

- 23. Prove that $[A \land (A \rightarrow B] \rightarrow B$ is a tautology.
- 24. Explain the following terms:
 - a) Literal
 - b) Atom
 - c) Term
- 25. Sketch the graph and find spanning tree for the vertices V={A,B,C,D,E}

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(2×15=30)