QP Code: UV25DIS005

Reg. No : ....
Name : ....

ST MARY'S COLLEGE (AUTONOMOUS), THRISSUR-20

I SEMESTER (CBCSS-VUG) DEGREE EXAMINATIONS, NOVEMBER 2025
(Improvement/Supplementary)
B. Voc. Software Development
SDC1IT01 : Discrete Mathematics
2024 Admission Only
(Credits: 4)

Time: 2.5 Hours **Maximum Marks: 80**

Section A

*Short answer type carries **2** Marks each.* ***(Ceiling 25)***

1. Write is the negation of the statement 2+3 > 1.
2. Prove that $p \vee \neg p$ is a tautology.
3. Define Existential Quantifier.
4. State Absorption law in Boolean Algebra.
5. Define Reflexive and Transitive relation.
6. Draw the schematic diagram of OR gate with input output table.
7. If $V = \{a, b, c, d\}$, $X = \{\{a, b\}, \{a, c\}, \{a, d\}\}$. Draw the graph $G = (V, X)$.
8. Define an isolated point of a graph. Give an example.
9. Define a bipartite graph. Give an example.
10. Define a cut edge and give an example.
11. Explain a weighted graph with an example.
12. Define a tree and give an example.
13. Draw a Kuratowski second graph.
14. Draw the dual graph of $G = (V, X)$ where $V = \{1, 2, 3\}$, $X = \{\{1, 2\}, \{1, 3\}, \{2, 3\}\}$.
15. Define a pendant vertex.

Section B

*Paragraph types carries **5** Marks each.* ***(Ceiling 35)***

16. Write converse, inverse and contrapositive of the following conditional statements.
    i) If today is easter then tomorrow s monday.
    ii) If a triangle is isosceles then it is not equilateral.
17. Show that $\neg(p \wedge q) \wedge q$ is logically equivalent to $\neg p \wedge q$.

18. State and prove Idempotent law of Boolean Algebra.

19. Simplify $AB' + (A' + B' + C.C')'$.

20. Explain the terms walk, initial point, terminal point of a graph G, with an example.

21. Explain chromatic number of a graph. Give the chromatic number and colour class of the graph $G = (V, X)$, where $V = \{1, 2, 3, 4\}$, $X = \{\{1, 2\}, \{2, 3\}, \{3, 4\}\}$.

22. Describe connectivity and edge connectivity of a graph.

23. Define a digraph and explain a walk and a path on it. Give example.

Section C

*Essay-type carries **10** Marks. Answer **any two**.*

24. Construct the truth table of $\neg p \wedge (\neg q \wedge r) \vee (q \wedge r)$.

25. Explain the following gates with input output tables.
    i) AND gate
    ii) OR gate
    iii) NOT gate
    iv) NAND gate
    v) NOR gate

26. Describe the travelling salesman problem and give an example.

27. Draw the graph $G = (V, X)$ where $V = \{v_1, v_2, v_3, v_4\}$ and $X = \{\{v_1, v_2\}, \{v_1, v_3\}, \{v_1, v_4\}\}$. Also, give its incidence matrix.

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