

24U118S

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Name: .....

Reg.No: .....

**FIRST SEMESTER BCA DEGREE EXAMINATION, NOVEMBER 2024**

(CBCSS - UG)

**CC19U BCA1 C02 - DISCRETE MATHEMATICS**

(Computer Application - Complementary Course)

(2019 to 2023 Admissions - Supplementary/Improvement)

Time : 2.00 Hours

Maximum : 60 Marks

Credit : 3

**Part A** (Short answer questions)

Answer *all* questions. Each question carries 2 marks.

1. Which of the following are propositions?  
a) The earth is flat.                      b) What a beautiful day.
2. Give examples for binary operators and unitary operators.
3. What are the basic operations performed in a boolean algebra ?
4. Define Graph and give an example.
5. Define Complete graph and draw a complete graph of three vertices.
6. Define wheel graph and find its chromatic number.
7. Define bipartite graph and draw an example.
8. Prove that the number of vertices  $n$  in a binary tree is always odd.
9. Define chord of a tree and nullity of a graph.
10. Define fundamental circuit of a connected graph.
11. Draw a graph for connected graphs and unconnected graphs with five vertices.
12. Define subgraph generated by a vertex set.

**(Ceiling: 20 Marks)**

**Part B** (Short essay questions - Paragraph)

Answer *all* questions. Each question carries 5 marks.

13. (i) What you mean by power set of a set?  
(ii) Write the power set of the set  $A = \{a, b\}$ .
14. Check whether the relation  $R$  on the set  $\mathbb{R}$  of real numbers, given by  $R = \{ \langle a, b \rangle : a \leq b \}$  is an equivalence relation on  $\mathbb{R}$ .

15. Draw the logic gate circuit for the Boolean expression  $(A \cdot B) + \overline{(A + B)}$ .
16. Explain simple graph and isomorphism with suitable example.
17. Explain cycle, simple cycle and elementary cycle with suitable examples.
18. Explain tree and its properties with suitable examples.
19. Explain the following:
  - a) Planar graph
  - b) Kuratowski first graph.
  - c) Kuratowski second graph.
  - d) Planar representation of a graph.

**(Ceiling: 30 Marks)**

**Part C (Essay questions)**

Answer any *one* question. The question carries 10 marks.

20. a) Using the laws of logic simplify the boolean expression  $(p \wedge \sim q) \vee q \vee (\sim p \wedge q)$ .  
 b) Verify  $p \wedge (q \wedge r) \equiv (p \wedge q) \wedge r$ .
21. (i) Let  $A = \{1, 2, 3\}$ ,  $\mathcal{X}$  denotes the power set of  $A$ . Then draw the Hasse diagram for the inclusion relation on  $\mathcal{X}$  defined by  $\subseteq = \{ \langle A', A'' \rangle : A' \subseteq A'', A' \in \mathcal{X}, A'' \in \mathcal{X} \}$ .  
 (ii) Find the least member and greatest member, if any, in this poset.  
 (iii) Find the minimal members and maximal members, if any, in this poset.

**(1 × 10 = 10 Marks)**

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