

FIRST SEMESTER B.C.A. DEGREE EXAMINATION, NOVEMBER 2021

(CBCSS - UG)

(Regular/Supplementary/Improvement)

CC19U BCA1 C02 - DISCRETE MATHEMATICS

(Computer Application - Complementary Course)

(2019 Admission onwards)

Time : 2.00 Hours

Maximum : 60 Marks

Credit : 3

Part A (Short answer questions)Answer *all* questions. Each question carries 2 marks.

1. Determine whether $[p \wedge (p \rightarrow q)] \rightarrow q$ is a tautology.
2. If $A = \{\alpha, \beta\}$ and $B = \{1, 2, 3\}$. Find $A \times B$.
3. Draw the truth table for the conjunction operator in a boolean algebra.
4. What is undirected graph and give an example?
5. Define circuit of a graph and give an example.
6. Prove or disprove : The degree of every vertex in a complete graph of n vertices is $n - 1$.
7. Define bipartite graph and draw an example.
8. Draw a tree with two pendant vertices three pendant vertices.
9. Briefly explain the algorithm for shortest spanning tree.
10. Prove or disprove : The vertex connectivity of a tree is one.
11. What is the difference between weakly connected graph and strongly connected graph?
12. Define Euler line and Euler graph.

(Ceiling: 20 Marks)**Part B** (Short essay questions - Paragraph)Answer *all* questions. Each question carries 5 marks.

13. Evaluate the boolean expression where $a = 2, b = 3, c = 5$ and $d = 7$
 a) $\sim \{(a \leq b) \wedge [\sim (c > d)]\}$ b) $\sim [(a > b) \vee (b \leq d)]$
14. Explain quantifiers with suitable examples.
15. Draw the logic gate circuit for the Boolean expression $(\overline{A \cdot C}) \cdot (\overline{B + C})$.
16. Explain simple graph and isomorphism with suitable example.

17. Explain the concept of chromatic number on complete graph, cycles, wheel graph.
18. Explain the following:
- Spanning tree.
 - Rank of a graph G .
 - Nullity of a graph G .
 - Branch of a tree.
 - Chord of a tree.
19. Explain the following:
- Planar graph.
 - Kuratowski first graph.
 - Kuratowski second graph.
 - Planar representation of a graph.

(Ceiling: 30 Marks)

Part C (Essay questions)

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

20. If $U = \{1, 2, 3, \dots, 10\}$, $A = \{1, 2, 3, 4, 5\}$ and $B = \{1, 3, 5, 7, 9\}$, find
- (i) $(A \cup B)^c$ (ii) $A^c \cup B^c$ (iii) $A - B$ (iv) $B - A$
21. (i) Let $A = \{a, b\}$, X denotes the power set of A . Then draw the Hasse diagram for the inclusion relation on X defined by $\subseteq = \{ \langle A', A'' \rangle : A' \subseteq A'', A' \in X, A'' \in X \}$.
- (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)
