20U111 (Pages: 2) Name: .....

Reg.No: .....

FIRST SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2020

(CBCSS - UG)

(Regular/Supplementary/Improvement)

CC19U BCA1 C02 - DISCRETE MATHEMATICS

(Mathematics - Complementary Course)

(2019 Admission onwards)

Time : 2.00 Hours Maximum : 60 Marks

Credit : 3

Part A (Short answer questions)

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

1. Determine whether $\sim p \leftrightarrow (p \vee \sim p)$ is a contradiction.
2. Negate each quantified propositions
   a). Every computer is a 16-bit machine.
   b). Every super computer is manufactured in Japan.
3. Draw the logic gate circuit for the Boolean expression $(A.B) + (\overline{A})$.
4. Define directed edge of a graph.
5. Define isolated node and give an example.
6. Define length of a graph and give an example.
7. Define $n-$Star and find its chromatic number.
8. Define minimally connected graph.
9. Define a weighted graph and give an example.
10. Prove or disprove: Every edge of a tree is a cut-set.
11. What is the difference between weakly connected graph and strongly connected graph.
12. Write the Euler's formula for connected planar graph.

Ceiling: 20 Marks

Part B (Short essay questions)

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

13. Construct a truth table of

    a). $(p \wedge q) \rightarrow (p \vee q)$.

    b). $(p \vee q) \leftrightarrow (p \wedge q)$.

14. (i) What you mean by power set of a set ?

    (ii) Write the power set of the set $A = \{1, 2, 3, 4\}$.

15. Using truth tables, prove the distributive laws in a boolean algebra.

16. Explain complete graph with examples.

17. Explain bipartite and complete bipartite graph with suitable examples.

18. Explain the following

    a) Spanning tree b) Rank of a graph G. c) Nullity of a graph G

    d) Branch of a tree. e) Chord of a tree.

19. Explain planar graph and non planar graph with examples.

Ceiling: 30 Marks

Part C (Essay questions)

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

20. (i) Show that the relation R on the set $\mathbb{Z}$ of integers given by $R = \{< a, b >:\ 2 \text{ divides } a - b\ \}$ is an equivalence relation on $\mathbb{Z}$.

    (ii) Give an example of a relation, which is reflexive and transitive, but not symmetric.

21. (i) Draw the Hasse diagram for the relation $\leq$ on $X = \{2, 3, 6, 12, 24, 36\}$ defined by $\leq = \{< x, y >:\ x \text{ divides } y\}$.

    (ii) Find the minimal members and maximal members, if any, in this poset.

(1 × 10 = 10 Marks)

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