19U119A (Pages: 3) Name: …….

Reg. No……...

FIRST SEMESTER B.C.A. DEGREE EXAMINATION, NOVEMBER 2019

(Supplementary/Improvement)

(CUCBCSS-UG)

CC15U BCA1 C02/CC17U BCA1 C02 - DISCRETE MATHEMATICS

(Mathematics - Complementary Course)

(2015 to 2018 Admissions)

Time: Three Hours Maximum: 80 Marks

PART A

Answer ***all*** questions. Each question carries 1 mark.

1. Write the power ste of $A = \{5, 6, 7\}$
2. Define proposition.
3. State De-Morgan's law.
4. Define poset.
5. Define degree of a vertex.
6. Draw the undirected graph of K_5
7. Define spanning tree.
8. Define height of a tree.
9. Which are the two Kuratowski's graph?
10. Given $P = \{2, 3, 4, 5, 6\}$, state the truth value of the statement $(\exists x \in P)(x + 3 = 10)$

(10 x 1 = 10 Marks)

PART B

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

11. Construct truth table for $(p \to q) \to (p \wedge q)$
12. Define greatest lower bound and least upper bound of a subset of poset $(P, \leq)$
13. Define walks and paths in a graph. Differentiate between them.
14. Define centre of a tree.
15. Explain directed graphs. Which are the two types of degrees of vertices exist in a directed graph?

(5 x 2 = 10 Marks)

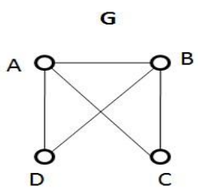
PART C

Answer any ***five*** questions. Each question carries 4 marks.

16. Enumerate various types of sets. Give examples for each set.
17. Explain travelling salesman problem.
18. Explain the two types of connectivity in a graph. What is a seperable graph?
19. Define the quantifiers used in predicate calculus with examples.
20. Draw the undirected graph represented by adjacency matrix M_A shown below

$$M_A = \begin{bmatrix} 0 & 1 & 1 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 1 & 1 \end{bmatrix}$$

21. Draw all the spanning trees of the graph G shown below



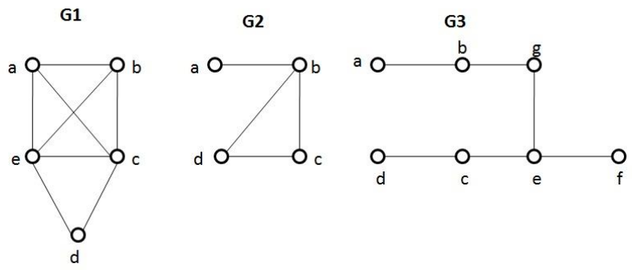
22. Define a connected graph and disconnected graph with examples.
23. Prove the following identity using Boolean algebra $A\left(\overline{A}+C\right)\left(\overline{A}B+\overline{C}\right)=0$

(5 x 4 = 20 Marks)

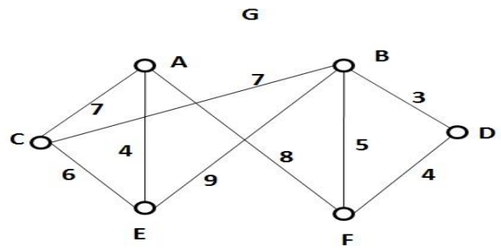
PART D

Answer any ***five*** questions. Each question carries 8 marks.

24. Prove $\left(\left(p\vee q\right)\wedge\neg\left(\neg p\wedge\left(\neg q\vee\neg r\right)\right)\right)\vee\left(\neg p\wedge\neg q\right)\vee\left(\neg p\wedge\neg r\right)$ is a tautology.
25. Which of the following simple graphs have a Hamiltonian circuit or, if not, a Hamiltonian path?



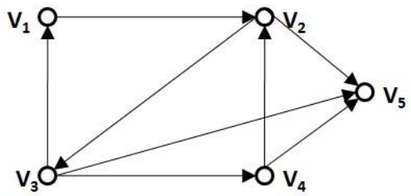
26. Find a minimum spanning tree of the labeled connected graph G shown below using prims algorithm.



27. Define

    a) Adjacency matrix b) Incidence matrix of a graph with examples.

28. Consider the directed graph as shown in figure. Show the four different subgraphs of this graph having atleast four vertices.



29. (a) Show that $p\leftrightarrow q\equiv\left(p\rightarrow q\right)\wedge\left(q\rightarrow p\right)$.

    (b) Let A={1,2,3,4} and R={(1,1),(1,3), (2,2), (2,4), (3,1), (3,3), (4,2), (4,4)}. Is it an equivalence relation?

30. Discuss about relations and their properties.
31. Prove

    a) Involution law.
    b) Identity law.
    c) Absorption law.
    d) Idempotent law.

(5 x 8 = 40 Marks)

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