23P159 (Pages: 2) Name: .....

Reg.No: .....

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2023

(CBCSS - PG)

(Regular/Supplementary/Improvement)

CC19P CSS1 C01 - DISCRETE MATHEMATICAL STRUCTURES

(Computer Science)

(2019 Admission onwards)

Time : 3 Hours Maximum : 30 Weightage

Part-A

Answer any ***four*** questions. Each question carries 2 weightage.

1. If A={1,5,2} and B={2,4,9,6,1} find (A-B)x(B-A)
2. What are the contra positive, the converse and the inverse of the conditional statement "If you work hard then you will be rewarded"?
3. Explain different types of functions.
4. Define Boolean algebra.
5. Define Abelian group with example.
6. Define connected and disconnected graph with example.
7. What is a bipartite graph and a complete bipartile graph? Give one example.

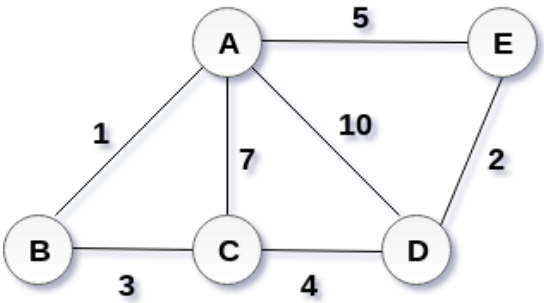
(4 × 2 = 8 Weightage)

Part-B

Answer any ***four*** questions. Each question carries 3 weightage.

8. Represent the following sentence in predicate logic using quantifiers i) All men are mortal. ii) Every apple is red iii) Any integer is either positive or negative.
9. Let X={1, 2, 3, 4, 5} and Let R={(1, 2), (3, 4), (2, 2)} and S={(4, 2), (2, 5), (3, 1), (1, 3)} be the relations defined on X. Find R◦S , S◦R , R◦(S◦R) , (R◦S)◦R , R◦R , S◦S and R◦R◦R.
10. Let X = {1, 2 ……7 }and R = {< X,Y> / X-Y is divisible by 3}. Show that R is an equivalence relation. Draw the graph R.
11. Define distributive and complemented lattices.Explain with example.
12. Explain Ring with example.
13. Compare Eulerian and Hamiltonian graphs with suitable examples.

14. Use Kruskal's algorithm to find minimum spanning tree for the weighted graph given below:



(4 × 3 = 12 Weightage)

Part-C

Answer any ***two*** questions. Each question carries 5 weightage.

15. a. Prove the following $(\neg P \vee Q) \wedge (P \wedge (P \wedge Q)) \equiv P \wedge Q$
    b. Show that $((P \rightarrow Q) \wedge (Q \rightarrow R)) \rightarrow (P \rightarrow R)$ is a tautology.

16. Determine whether the following posets are lattices. (i) $(1, 2, 3, 4, 5)$, (ii) $(1, 2, 4, 8, 16)$

17. State and prove Lagrange‟s theorem.

18. Discuss Dijkstra‟s shortest path algorithm with example.

(2 × 5 = 10 Weightage)

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