22P159 (Pages: 2) Name: .....

Reg.No: .....

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2022

(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. Prove that n (AUB) = n (A) + n (B) − n (A∩B) for any two sets A and B.
2. Define Existential Quantifier.Given P = {2,3,4,5,6}, state the truth value of the statement (∃x ∈ p)(x + 3 = 10).
3. Let A = {0, 1, 2, 3} and define a relation R on A as follows: R = {(0, 0), (0, 1), (0, 3), (1, 0), (1, 1), (2, 2), (3, 0), (3, 3)}. Is R reflexive? symmetric? transitive?
4. Explain Boolean Algebra.
5. Explain Semigroup and monoid with example
6. Differentiate bipartile and complete bipartile graph with example.
7. Define with an example: i. Euler circuit ii. Hamiltonian circuit

(4 × 2 = 8 Weightage)

Part-B

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

8. (a) Get the contra positive of the statement “If it is raining then I get wet”.
   (b) Show that the propositions p --> q and ¬p V q are logically equivalent.
9. Suppose f(x) = x+2 , g(x) = x-2, and h(x) = 3x for x ε R , where R is the set of real numbers. Find (g o f), (f o g) , (f o f) and (g o g)
10. Which elements of the poset ({2,4,5,10,12,20,25},/) are maximal and which are minimal?
11. Define distributive and complemented lattices.Explain with example.
12. Show that the set G {-1,1, -i, i) is a group with respect to multiplication.
13. Explain connectedness in graph theory.
14. Prove that the number of edges in a tree with n vertices is n-1. Conversely show that a connected graph with n vertices and n-1 edges is a tree.

(4 × 3 = 12 Weightage)

Part-C

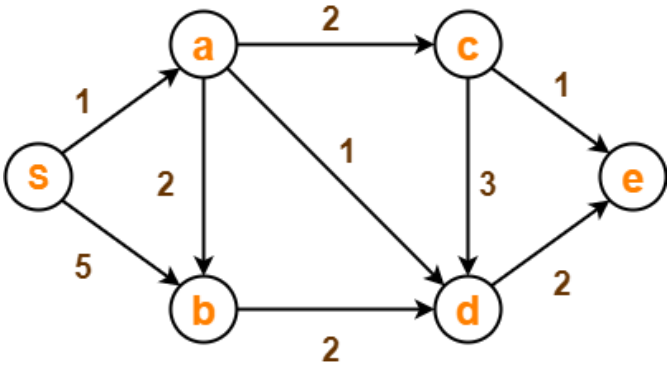
Answer any ***two*** questions. Each question carries 5 weightage.

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. Prove that every finite integral domain is a field.

18. Find the shortest path between A to H by Dijkstra's algorithm for the following weighted graph.



(2 × 5 = 10 Weightage)

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