25P158 (Pages: 2) Name: .....

Reg.No: .....

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2025

(CBCSS - PG)

(Regular/Supplementary/Improvement)

CC19PCSS1C01 - 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. Among 100 students, 32 study mathematics, 20 study physics, 45 study biology, 15 study mathematics and biology, 7 study mathematics and physics, 10 study physics and biology and 30 do not study any of the three subjects. i) Find the number of students studying all three subjects. ii) Find the number of students studying exactly one of three subjects.
2. Prove that (P →Q) V R (PVR) → (Q v R).
3. Let A = {1, 2, 3, 4, 6, 8, 9, 12, 18, 24}. Consider relation ‚x divides y", is a partial order relation. Draw the Hasse diagram of the poset (A, ≤).
4. Explain distributive Lattice with example.
5. Explain group with example.
6. Define complete bipartile graph.Draw a complete bipartite graph of K2, 3 and K3, 3
7. Define Eulerian graph.Draw a graph that is both Eulerian and Hamiltonian.

(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. Find f^{-1} (x) where f (x) =(x + 4) / (x - 3)
10. Explain closure of a relation with example.
11. Consider the lattice D20 and D30 of all positive integer divisors of 20 and 30 respectively, under the partial order of divisibility. Show that is a Boolean algebra.

12. Show that every cyclic group is an abelian group.
13. Discuss Königsberg Bridge problem. Prove that a finite connected graph G is Eulerian if and only if each vertex has even degree?
14. Explain Homomorphism and Isomorphism of groups with example.

(4 × 3 = 12 Weightage)

Part-C

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

15. "All human beings are mortal. If John is mortal then John is clever. But, it is not the case that John is a human being and John is clever. However, John is a human being or John is a robot. Therefore, John is a robot"
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. Explain Prims Algorithm with example.

(2 × 5 = 10 Weightage)

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