D1ACS2501 **(2 Pages)** **Name.....**
Reg.No.....

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2025
(Regular/Improvement/Supplementary)

COMPUTER SCIENCE
FCSS1C01 – DISCRETE MATHEMATICAL STRUCTURES

Time: 3 Hours **Maximum Weightage: 30**

Section A: Short answer questions. Answer any *four* questions. Each carries *two* weightage.

1. Find the disjunctive normal form of $(p \wedge (p \rightarrow q)) \rightarrow q$
2. Define domain and range of a relation with example.
3. What is free and bound variables?
4. Write the dual of each Boolean equation: (i) (a * 1) * (0 + a') = 0 (ii) a + a' b = a + b.
5. Draw the complete Bipartite graph $K_{2,3.}$
6. Consider the group G = {1, 2, 3, 4, 5, 6} under multiplication modulo 7. Find the orders and subgroups generated by 2 and 3.
7. Show that the number of vertices of odd degree in a graph is always even.

(4 × 2 = 8 weightage)

Section B: Short essay questions. Answer any *four* questions. Each carries *three* weightage.

8. Construct the truth table for the statement $(\neg p \rightarrow r) \wedge (p \leftrightarrow q)$.
9. Explain Equivalence Relations with example.
10. Discuss about Distributive Lattices and Complemented Lattices.
11. Explain different types of functions with example.
12. Define group. Explain their properties.
13. Prove that in a ring R: (i) a.0 = 0.a = 0 (ii) a (-b) = (-a) b = - ab (iii) (-1) a = -a, where R has an identity element 1.
14. Explain: i) Eulerian Paths and Circuits; ii) Hamiltonian Paths and Circuits.

(4 × 3 = 12 weightage)

(P.T.O.)

Section C: Essay questions. Answer any *two* questions. Each carries *five* weightage.

15. Define set. Explain different types of set and different set operations with example.
16. Define relation. Explain different types of relations and Closure properties of relations.
17. Reduce the following Boolean expression.

    (a) $F(X, Y, Z) = X'Y + YZ' + YZ + XY'Z'$ (b) $(AB'(C+BD) + A'B')\ C$

18. Explain Prim's Algorithm with example.

(2 × 5 = 10 weightage)