D1ACS2201 **(2 Pages)** **Name.....**
Reg.No.....

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2022
(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. Explain the different connectives used in propositional logic.
2. Define set equality and demonstrate with an example.
3. What are the properties of binary relations?
4. Define: a) Sub-lattice; b) Complemented Lattice.
5. What are rings?
6. Elaborate on bipartite graphs.
7. What is a minimum spanning tree? Explain with an example.

(4 × 2 = 8 weightage)

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

8. Show that $\overline{(P \wedge Q)} \longrightarrow (P' \vee (P' \vee Q)) \Leftrightarrow (P' \vee Q)$
9. Let $X = \{1,2,3\}$ and f, g, h and s be functions from X to X given by f= {(1,2),(2,3),(3,1)} g={(1,2),(2,1),(3,3)} h= {(1,1),(2,2),(3,1)} s={(1,2),(2,2),(3,3)}. Find: a) $f_o g$ b)$g_o f$ c)$s_o g$ d)$s_o s$.
10. Explain Inverse functions. Show that the functions f(x)= x^3 and g(x) = $x^{1/3}$ for $x \in R$ $(x\ divides\ y)$ are inverse of one another.
11. Determine whether the set $G = \{(a, b): a, b \in R, a \neq b\}$ under the operation defined as $(a.b).(c.d) = (ac + bc + d)$ for all $(a, b), (c,d) \in G$ is an abelian group.
12. Let x= {2, 3, 6, 12, 24, 36}, a relation $\leq$ is defined as x≤y if x divides y. Draw the Hasse diagram for (x, ≤).
13. Prove that tree with n vertices has n-1 edges.
14. What are complete graphs? Draw complete graphs with 3, 4 and 5 vertices.

(4 × 3 = 12 weightage)

(P.T.O.)

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

15. Show that $\forall x P(x) \vee Q(x) \Longrightarrow \forall x P(x) \vee \exists x Q(x)$

16. Define Groups, Fields , Rings and Integral domains with examples.

17. Let f be the function from {a,b,c} to {1,2,3} such that f(a) = 2, f(b) = 3, and f(c) = 1. Is f invertible, and if it is, what is its inverse? Let f be the function from R to R with f (x) =x^2. Is f invertible?

18. Explain Kruskal's algorithm with an example.

(2 × 5 = 10 weightage)