Roll No											

PRESIDENCY UNIVERSITY
BENGALURU

SET - A

SCHOOL OF ENGINEERING
END TERM EXAMINATION - JUN 2023

Semester : Semester II - 2022
Course Code : MAT2004
Course Name : Sem II - MAT2004 - Discrete Mathematical Structures
Program : CAI,COM,CSE&CSG

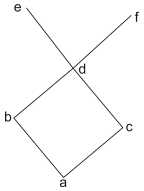
Date : 23-JUN-2023
Time : 1.00PM - 4.00PM
Max Marks : 100
Weightage : 50%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculator are permitted.
(iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS **(10 X 2 = 20M)**

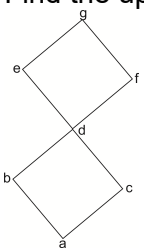
1. Write P(S) where S={a,b}.
(CO2) [Knowledge]
2. State the inverse of the statement $p_1 \rightarrow p_2$.
(CO1) [Knowledge]
3. Find the number of 5-combinations from a set with 4 elements when repetition of elements is allowed.
(CO4) [Knowledge]
4. For the relation {(1, 1), (1, 2), (2, 1), (2, 2), (3, 3), (4, 4)} on the set {1, 2, 3, 4}, decide whether it is symmetric, and whether it is antisymmetric.
(CO2) [Knowledge]
5. List the truth values of propositions S(2, 1) and S(3, 0) for the statement such that S(x,y) : y=x+2, where x and y are variables.
(CO1) [Knowledge]
6. Write the truth table for ⌉p^q.
(CO1) [Knowledge]
7. What are the values of $\lfloor 3.6 \rfloor$ and $\lceil -2.4 \rceil$.
(CO2) [Knowledge]
8. Find the maximal element for the set {a, b, c, d, e, f}.



(CO3) [Knowledge]

9. Write the relation for the given poset and draw the directed graph of ({1, 2, 3, 4}, ≤). (CO2) [Knowledge]

10. Find the upper bound for the element {b,c}



(CO3) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS **(5 X 10 = 50M)**

11. Show that the premises “If you send me an e-mail message, then I will finish writing the program,” “If you do not send me an e-mail message, then I will go to sleep early,” and “If I go to sleep early, then I will wake up feeling refreshed” lead to the conclusion “If I do not finish writing the program, then I will wake up feeling refreshed.”

(CO1) [Comprehension]

12. Show that a mapping $f : R \to R$ defined by $f(x) = 3 - 9x$ for $x \in R$ is a bijective map from R to R and hence find out the inverse of f .

(CO2) [Comprehension]

13. How many ways are there to put four different employees into three indistinguishable offices, when each office can contain any number of employees? Also list all the possible ways.

(CO4) [Comprehension]

14. Let R be the relation on the set of real numbers such that aRb iff a − b is an integer. Explain R is an equivalence relation.

(CO2) [Comprehension]

15. a) Let P = {1, 2, 3, 4, 5} and ≤ be the relation “less than or equal to”. Draw the Hasse diagram of (P, ≤).
b) Let X = {2, 3, 6, 12, 24, 36}, and the relation ≤ be such that x ≤ y if x divides y. Draw the Hasse diagram of (X, ≤).

(CO3) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS **(2 X 15 = 30M)**

16. Prove that $(P(X), \subseteq)$ is a Boolean algebra, where $X = \{a, b, c\}$

(CO3) [Application]

17. a). Obtain PDNF of p→((p→q)∧¬(¬q∨¬p)) using truth table.
b). Verify the validity of the following arguments: "All Computer Science professors have studied Java. Raju is a Computer Science Professor. Therefore Raju has studied Java”.

(CO1) [Application]