Roll No											

PRESIDENCY UNIVERSITY
BENGALURU

SET - B

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)**

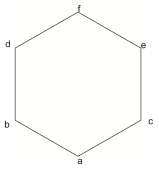
1. List the truth values of propositions Q(1, 2) and Q(3, 0) for the statement Q(x,y):y=x+5, where x and y are variables.

(CO1) [Knowledge]

2. How many solutions does the equation x + y + z = 4 have, where x , y, and z are nonnegative integers?

(CO4) [Knowledge]

3. Find the maximal element for the below hasse diagram.



(CO3) [Knowledge]

4. Write the values of $\lfloor 9.5 \rfloor$ and $\lceil -8.5 \rceil$

(CO2) [Knowledge]

5. Draw the truth table for ⅂p∨q.

(CO1) [Knowledge]

6. Write the inverse of $\neg p_1 \rightarrow \neg p_2$.

(CO1) [Knowledge]

7. Write the relation for the poset and draw the directed graph of ({1, 2, 3, 4, 5}, |).

(CO2) [Knowledge]

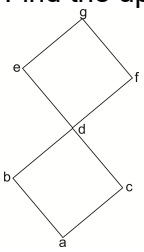
8. For the relation {(2, 2), (2, 3), (2,4), (3, 2), (3, 3), (3, 4)} on the set {1, 2, 3, 4}, decide whether it is reflexive, and whether it is transitive.

(CO2) [Knowledge]

9. Write the power set of { 2,3}

(CO2) [Knowledge]

10. Find the upper bound for the element {e,f}



(CO3) [Knowledge]

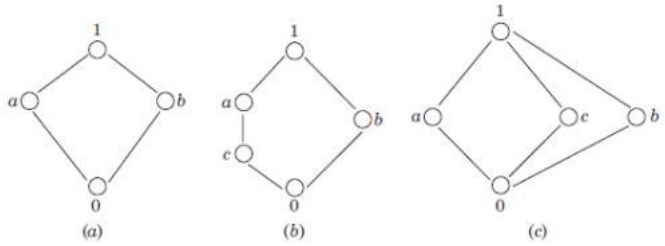
PART B

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

11. Prove that the relation “congruence modulo m” over the set of positive integers is an equivalence relation.

(CO2) [Comprehension]

12. Define complemented lattice and Show that the Lattices shown in Fig (a), (b) and (c) are complemented lattices.



(CO3) [Comprehension]

13. a)How many ways are there to pack six copies of the same book into four identical boxes, where a box can contain as many as six books? Also list all the possible ways.

b)How many ways are there to place 10 indistinguishable balls into eight distinguishable bins?

(CO4) [Comprehension]

14. Let $f : R \to R$ be a function defined by $f(x) = 3x + 6$. Find the inverse for $f(x)$.

(CO2) [Comprehension]

15. Show that the following premises lead to the conclusion Glasses are on the coffee table.
a. If I was reading my class notes in the kitchen, then my glasses are on the kitchen table.
b. If my glasses are on the kitchen table, then I saw them at breakfast.
c. I did not see my glasses at breakfast.
d. I was reading my class notes in the living room or I was reading my class notes in the kitchen.
e. If I was reading my class notes in the living room then my glasses are on the coffee table.

(CO2) [Comprehension]

PART C

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

16. a). Obtain the principal conjunctive normal form of the formula $p \vee (\neg p \rightarrow (q \vee (\neg q \rightarrow r)))$.
b). Verify the validity of the following arguments: “All Computer Science professors have studied Java. Raju has not studied Java. Therefore, Raju is not a Computer Science Professor”.

(CO1) [Application]

17. Prove that cancellation laws hold in Boolean algebra and also prove that complement of any element is unique.

(CO3) [Application]