Roll No										

PRESIDENCY UNIVERSITY BENGALURU

SET A

SCHOOL OF INFORMATION SCIENCE

END TERM EXAMINATION - JAN 2024

Semester : Semester I - 2023

Course Code : MAT3001

Course Name : Mathematical Foundation of Computer Application

Program : MCA

Date : 13-JAN-2024

Time : 1:00 PM - 4:00 PM

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 **5X4=20M**

1. What are the truth values of the proposition Q(1,2) and Q(3,0) for the statement Q(x,y): x = y+3.
(CO1) [Knowledge]

2. Draw the Hasse diagram for a set of positive integral divisors of 6. Under the relation divisibility.
(CO2) [Knowledge]

3. Define homomorphism of groups with an example.
(CO3) [Knowledge]

4. Define Isolated vertex and pendent vertex with example for each.
(CO4) [Knowledge]

5. Define directed graph with example
(CO4) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS **5X10=50M**

6. Prove that $(p \to (q \vee r)) \leftrightarrow ((p \wedge \sim q) \to r)$ is a tautology using truth table
(CO1) [Comprehension]

7. Show that $(D_{30}, /)$ is a Boolean algebra, where D_{30} is the set of all positive divisors of 30.
(CO2) [Comprehension]

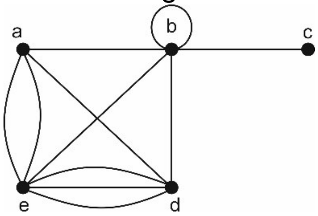
8. Show that distributive law x(y+z)=xy+xz is valid using Boolean function.
(CO2) [Comprehension]

9. Find whether the the following set together with the binary operation is a semigroup, a monoid, or neither, if it is a monoid specify the identity, If it is a semigroup or a monoid determine whether it is a commutative.

(i) A=set of all positive integers $a \star b = max(a, b)$ i.e bigger of a and b (ii) Set, S ={1,2,3,6,9,18} where $a \star b = LCM(a, b)$

(CO3) [Comprehension]

10. Write the degrees and Neighborhoods of all the vertices of following graph.



(CO4) [Comprehension]

PART C

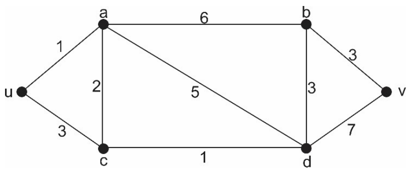
ANSWER ALL THE QUESTIONS **15X2=30M**

11. Group code defined by $e : B^2 \to B^5$ such that e(00)=00000,e(01)=01110,e(10)=10101,e(11)=11011, decode the following words relative to maximum likelihood decoding function (a)11110, (b)10011, (c) 10100.

(CO3) [Application]

12. (a) Explain the Kruskal's algorithm.

(b) Apply Dijkstra's algorithm to the following graph to find the shortest path from u to v.



(CO4) [Application]