Roll No

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF INFORMATION SCIENCE
MID TERM EXAMINATION - DEC 2023

Semester : Semester I - 2023

Course Code : MAT3001

Course Name : Sem I - MAT3001 - Mathematical Foundation of Computer Application

Program : MCA

Date : 26-DEC-2023

Time : 10:00AM - 11:30AM

Max Marks : 50

Weightage : 25%

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 **(5 X 2 = 10M)**

1. Write the truth value of disjunction of the statements “The earth is flat” and “3+5=8”.
(CO1) [Knowledge]

2. Let p be the statement “You can take the flight,” and let q be the statement “You buy a ticket.” Express $p \leftrightarrow q$ as a statement in English.
(CO1) [Knowledge]

3. What are the contrapositive, and the inverse of the conditional statement “The home team wins whenever it is raining?”
(CO1) [Knowledge]

4. Write the following statements in symbolic form (a) Some integers are divisible by 5 and (b) No real numbers is greater than its square.
(CO1) [Knowledge]

5. Define partially ordered set with an example.
(CO2) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS **(4 X 5 = 20M)**

6. Show that $(p \rightarrow q) \vee (\sim p \rightarrow r)$ is a tautology using truth table.
(CO1) [Comprehension]

7. Show that $(p \leftrightarrow q) \Leftrightarrow \sim (p \vee q) \vee (p \wedge q)$ without using truth table.

(CO1) [Comprehension]

8. Show that $(\forall x)(p(x) \rightarrow q(x)) \wedge (\forall x)(q(x) \rightarrow r(x)) \Rightarrow)(\forall x)(p(x) \rightarrow r(x))$

(CO1) [Comprehension]

9. Show that the divisibility relation " / " is a partial ordering on the set of positive integers.

(CO2) [Comprehension]

PART C

ANSWER THE FOLLOWING QUESTION **(1 X 20 = 20M)**

10. (a) Obtain the disjunctive normal form and conjunctive normal form of $\sim (p \vee q) \leftrightarrow p \wedge q$ without using truth table.

(b) Test the validity of the following arguments:

1. If milk is black then every cow is white.
2. If every cow is white then it has 4 legs.
3. If every cow has 4 legs then every Buffalo is white and brisk.
4. The milk is black.
5. So, every Buffalo is white .

(CO1) [Application]