Roll No											

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING
MID TERM EXAMINATION - APR 2023

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

Date : 18-APR-2023
Time : 2PM - 3.30PM
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. Let p and q represent the following simple statements:
p : There is life on Mars,
q : There is life on Europa.
Express the following sentence in the symbolic form: “There is a life on Mars and not on Europa”.
(CO1) [Knowledge]

2. Describe the truth value assign to the bitwise OR operator if ‘x’ has truth value 1 and ‘y’ has truth value 0.
(CO1) [Knowledge]

3. State the inverse of the statement $p_1 \rightarrow p_2$.
(CO1) [Knowledge]

4. Write the rule of inference for Hypothetical Syllogism.
(CO1) [Knowledge]

5. Identify the quantifiers and write in symbolic form for the following statements:
(i). Something is good
(ii). Nothing is good
(CO1) [Knowledge]

PART B

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

6. Discuss whether the compound proposition (p → q) ∧ (q → r) → (p → r) is a tautology or not.

(CO1) [Comprehension]

7. Show that $(p \to r) \vee (q \to r)$ and $(p \wedge q) \to r$ are logically equivalent.

(CO1) [Comprehension]

8. Obtain the conjunctive normal form of p ∧ (p → q).

(CO1) [Comprehension]

9. Show that (*x*)(*P* (*x*) → *Q*(*x*)), (*x*)(*Q*(*x*) → *R*(*x*)), ∃*R*(*s*) ⇒ ∃*P*(*s*).

(CO1) [Comprehension]

PART C

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

10. Find the PDNF of $p \wedge \neg(q \wedge r) \vee (p \to q)$.

(CO1) [Application]

11. Show that the premises $p \to r, \neg p \to q, q \to s$ implies $\neg r \to s$

(CO1) [Application]