Roll No											

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING
MID TERM EXAMINATION - MAY 2023

Semester : Semester II - B.Tech MATH - 2022
Course Code : MAT2004
Course Name : Sem II - MAT2004 - Discrete Mathematical Structures
Program : Mathematics for B.Tech

Date : 19-MAY-2023
Time : 2.00 PM - 3.30 PM
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. Describe the rule of inference for “Modus tollens”.

(CO1) [Knowledge]

2. Let p and q be the propositions “Swimming at New Jersey shore is allowed,” and “Sharks have been spotted near the shore” respectively. Describe $\sim p \rightarrow \sim q$ as an English sentence.

(CO1) [Knowledge]

3. Name $r \rightarrow p$ where $p \rightarrow r$ represents a statement.

(CO1) [Knowledge]

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

(CO1) [Knowledge]

5. Outline the bitwise OR of the bit strings 01 0011 0110 and 11 0101 0010 is .....

(CO1) [Knowledge]

PART B

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

6. Identify whether $(p \wedge q) \rightarrow (p \vee q)$ is a tautology

(CO1) [Comprehension]

7. Show that $(x)(P(x) \rightarrow Q(x)), (x)(Q(x) \rightarrow R(x)) \Rightarrow (x)(P(x) \rightarrow R(x))$.

(CO1) [Comprehension]

8. Obtain CNF of ¬(p ↔ q).

(CO1) [Comprehension]

9. Justify p ↔ q and (p ∧ q) ∨ (¬p ∧ ¬q) are logically equivalent by truth table method.

(CO1) [Comprehension]

PART C

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

10. Choose appropriate inference rule to check whether these premises $p \rightarrow q, q \rightarrow r, \neg r, p \vee s, s \rightarrow t$ imply the conclusion t or not.

(CO1) [Application]

11. Show that the PCNF of $(p \wedge q) \vee (\neg p \wedge q \wedge r)$ is $(\neg p \vee q \vee r) \wedge (\neg p \vee q \vee \neg r) \wedge (p \vee q \vee r) \wedge (p \vee q \vee \neg r) \wedge (p \vee \neg q \vee r)$.

(CO1) [Application]