

Roll No



**PRESIDENCY UNIVERSITY  
BENGALURU**

**SET - B**

**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  $q$  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]
2. Outline the bitwise OR of the bit strings 01 0011 0110 and 11 0101 0010 is .....  
(CO1) [Knowledge]
3. Name  $r \rightarrow p$  where  $p \rightarrow r$  represents a statement.  
(CO1) [Knowledge]
4. Describe the rule of inference for "Modus tollens".  
(CO1) [Knowledge]
5. 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]

**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. Justify  $p \leftrightarrow q$  and  $(p \wedge q) \vee (\neg p \wedge \neg q)$  are logically equivalent by truth table method. (CO1) [Comprehension]
8. Obtain CNF of  $\neg(p \leftrightarrow q)$ . (CO1) [Comprehension]
9. Show that  $(\forall x)(P(x) \rightarrow Q(x)), (\forall x)(Q(x) \rightarrow R(x)) \Rightarrow (\forall x)(P(x) \rightarrow R(x))$ . (CO1) [Comprehension]

### PART C

#### ANSWER ALL THE QUESTIONS

(2 X 10 = 20M)

10. 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]
11. 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]