

Roll No



## PRESIDENCY UNIVERSITY BENGALURU

### SCHOOL OF ENGINEERING MID TERM EXAMINATION - OCT 2023

**Semester :** Semester III - B.Tech CSE - 2022

**Course Code :** MAT2004

**Course Name :** Sem III - MAT2004 - Discrete Mathematical Structures

**Program :** B.Tech. Computer Science and Engineering

**Date :** Oct 25, 2023

**Time :** 3:59 AM - 3:59 AM

**Max Marks :** 50

**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**

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

1. Let p and q be the propositions "Swimming at the New Jersey shore is allowed" and "Sharks have been spotted near the shore," respectively. Write each of these compound propositions as an English sentence. a)  $\neg q \rightarrow p$  b)  $\neg p \rightarrow \neg q$ .  
(CO1) [Knowledge]
2. Find the bitwise AND and bitwise OR of the bit strings 01 1011 0010 and 11 0001 1001.  
(CO1) [Knowledge]
3. State the converse, and the contrapositive of the conditional statement. "If it snows today, I will ski tomorrow".  
(CO1) [Knowledge]
4. Let P (x) denote the statement "x > 3." Identify the truth values of P (4) and P (2)?  
(CO1) [Knowledge]
5. State which rule of inference is the basis of the following argument. " It is above freezing now. Therefore, it is either above freezing or raining now".  
(CO1) [Knowledge]

#### PART B

**ANSWER ALL THE QUESTIONS**

**(4 X 5 = 20M)**

6. Show that  $p \vee (q \wedge r)$  and  $(p \vee q) \wedge (p \vee r)$  are logically equivalent by using the truth table.  
(CO1) [Comprehension]

7. Show that  $\neg(p \wedge q) \leftrightarrow (\neg p \vee \neg q)$  is tautology by using truth table. (CO1) [Comprehension]
8. Derive the conjunctive normal form of  $\neg(p \vee q) \leftrightarrow (p \wedge q)$  (CO1) [Comprehension]
9. Verify the validity of the following arguments: "All mathematics professors have studied discrete mathematical structure. Leena has not studied discrete mathematical structure. Therefore, Leena is not a mathematics professor". (CO1) [Comprehension]

### PART C

#### ANSWER THE FOLLOWING QUESTION

(1 X 20 = 20M)

10. a) Determine the principal conjunctive normal form of  $(p \vee q) \wedge (r \vee \neg p) \wedge (q \vee \neg r)$ .  
b) Show that  $(t \wedge s)$  is logically follows from the premises  $p \rightarrow q, q \rightarrow \neg r, r, p \vee (t \wedge s)$ . (CO1) [Application]