

# LNCT UNIVERSITY, BHOPAL

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Enroll No.....

Class Roll No.....

First Mid Semester Examination, OCT- 2024

Subject Name: Discrete Structure, Code-CS/AL/18-305

Branch : CSE/AIML/DS Semester: III

Time 1:30 Hrs

Max. Marks 20

Note: All questions are compulsory

Q.1 For any three sets A, B and C, prove that

(a)  $A - (B \cup C) = (A - B) \cap (A - C)$

(b)  $A \cap (B \Delta C) = (A \cap B) \Delta (A \cap C)$

OR

Q.1 Let R be a binary relation on the set of non negative integers such that

$R = \{(a, b) : 2 \text{ divides } (a-b)\}$  Is R an equivalence relation? (CO1 5marks)

Q.2 Use Mathematical induction to prove that  $11^{n+2} + 12^{2n+1}$  is divisible by 133 for all  $n \in \mathbb{N}$  (CO1 5marks)

OR

Q.2 A survey of 100 television watchers produced the following information:  
285 watch football games, 195 watch hockey games, 115 watch basketball games, 45 watch football and basketball games, 70 watch football and hockey games, 50 watch hockey and basketball games, 50 do not watch any of three games.

- (i) How many people in the survey watch all the three games?  
(ii) How many people watch exactly one of the three games? (CO1 5mark)

Q.3. Prove that the following statement is tautology:

$$(\sim q \rightarrow \sim p) \wedge (q \rightarrow p) \rightarrow (p \leftrightarrow q) \quad (\text{CO3 5 marks})$$

OR

Q.3 Show that  $p \rightarrow (q \rightarrow r) \equiv (p \wedge q) \rightarrow r$ . (CO3 5 marks)

Q.4 Obtain disjunction normal form of

$$P = [x \wedge (y' \vee z)] \vee z' \quad (\text{CO3 5 marks})$$

OR

Q.4 Obtain the CNF  $(\sim p \rightarrow r) \wedge (q \leftrightarrow p)$  (CO3 5 marks)