

**II.B.TECH-II-SEM-I MID EXAMINATIONS**

**Date:** 16-04-2024

**Time:** 01:00pm to 03:00pm

**Subject:** DISCRETE MATHEMATICS

**Branch:** Common to IT, CSE-DS, CS

**Marks:** 30 M

**Answer all the Questions. Each Question carries equal marks**

**2\*5=10 Marks**

1. **Classify** Algebraic structure, semi group with an example of each. (CO3)
2. **Explain** Reflexive, Transitive relation in a set. (CO2)
3. **Define** Predicate and Quantifiers with examples. (CO1)
4. **Describe** a function and write the types of Functions. (CO2)
5. **Construct** a truth table for  $(q \rightarrow \neg p) \leftrightarrow (p \leftrightarrow q)$ . (CO1)

**Answer Any 4 Questions. Each Question carries equal marks**

**5\*4=20 Marks**

6. **Define** Hasse Diagram. Draw the hasse diagram  $(x, \leq)$  for partial ordering  $x = \{2, 3, 6, 12, 24, 36\}$  and the relation  $\leq$  be such that  $x \leq y$  if  $x$  divides  $y$ . (CO3)
7. **Illustrate** Tautology and contradiction with an example and prove that  $p \vee (q \wedge r)$  and  $(p \vee q) \wedge (p \vee r)$  is a tautology (or) not by Using truth table. (CO1)
8. **Solve** the following Function  $f: N \rightarrow N$  and  $g: Z \rightarrow N$  be defined as follows  $f(n) = 3n + 2$  and  $g(n) = n^2 + 1$  find  
i)  $f \circ g$  ii)  $g \circ f$  iii)  $f \circ f$  iv)  $g \circ g$  (CO2)
9. **Show that** the premises "It is not sunny this afternoon and it is colder than yesterday".  
"We will go swimming only if it is sunny", "If we do not go swimming then we will take a canoe trip" and "if we take a canoe trip, then we will be home by sunset " lead to the conclusion "We will be home by sunset". (CO1)
10. a) **Prove that**  $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$  (CO2)  
b) **Find** the number of Mathematics students at a college talking at least one of the languages Telugu, Hindi and English given the following data.  
i) 65 study Telugu, 20 study Telugu and Hindi  
ii) 45 study Hindi, 25 study Telugu and English  
iii) 42 study English, 15 study Hindi and English  
iv) 8 study all three Languages
11. a) **Find** the PCNF for  $[(p \vee q) \wedge (\neg p \rightarrow \neg q)]$ . (CO1)  
b) **Find** the PDNF for  $[p \rightarrow (q \wedge r)] \wedge [\neg p \rightarrow (\neg q \rightarrow \neg r)]$ .