

II B.Tech I Semester Supplementary Examinations, November 2005
DISCRETE MATHEMATICAL STRUCTURES
(Computer Science & Systems Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. Determine whether each of the following inferences is valid or faulty. If the inference is valid/invalid produce some evidence using inference rules.
 - (a) If today is David's birthday then today is January 24.
 Today is January 24.
 Hence, today is David birthday.
 - (b) The days are becoming longer.
 The nights are becoming shorter if the days are becoming longer.
 Hence, the nights are becoming shorter. [8+8]
2. (a) Let R and S be relation on a set A. Prove or disprove the following
 - i. If R and S are asymmetric, then $R \cup S$ and $R \cap S$ are asymmetric.
 - ii. If R and S are antisymmetric, then $R \cup S$ and $R \cap S$ are antisymmetric
 (b) State the negation of
 - i. Relation R is both reflexive and transitive.
 - ii. Relation R is either Symmetric or transitive. [8+8]
3. (a) Describe different types of polish expression and their compilation process?
 (b) Convert the following Infix expression into prefix and postfix expression?
 $P - Q * R / S - (T + V) * Y$ [8+8]
4. (a) Describe basic concepts of set theory.
 (b) Describe General properties of semigroups and monoids? [6+10]
5. (a) Describe various properties about Lattices?
 (b) Explain Various Logic Programming Techniques? [8+8]
6. (a) Explain how Recursion is useful in mechanical theorem proving with your own example?
 (b) Describe and explain any four normal forms? [8+8]
7. Prove the following using laws of Boolean algebra?
 - (a) $X(\overline{X} + Y) = XY$
 - (b) $XYZ + \overline{X}Y + XY\overline{Z} = Y$
 - (c) $Y(W\overline{Z} + WZ) + XY = Y(W + X)$

$$(d) \overline{X}\overline{Y}Z + \overline{X}Y\overline{Z} + X\overline{Y}\overline{Z} + XY\overline{Z} = Z$$

[4+4+4+4]

8. Write shortnotes on any THREE the following

- (a) Predicate calculus
- (b) Discrete structures
- (c) Functions
- (d) Theory of inference.

[16]
