

**2005 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY**

**I I B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS**  
**DISCRETE MATHEMATICAL STRUCTURES**  
**(COMPUTER SCIENCE & SYSTEMS ENGINEERING)**

APRIL/MAY 2005

**TIME 3 HOURS**  
**MARKS: 80**

**Answer any FIVE Questions**  
**All Questions carry equal marks**

1. (a) Describe and explain various normal forms.  
 (b) Describe major principles of inference theory of the predicate calculus.
2. (a) Describe the definition of logic program and its resolution concepts.  
 (b) Describe the various logic programming techniques.
3. (a) Show that the transitive closure of an anti-symmetric relation always anti- symmetric.  
 (b) Show that the transitive closure of a reflexive and symmetric relation is an equivalence relation.
4. Apply the recursion theorem to verify that the following recursive definitions do in fact define functions.  
 (a)  $g(0) = 1$   
 $g(n+1) = 3g(n) + 7$  for  $n \geq 0$   
 (b)  $h(0) = 1$   
 $h(n+1) = 7h(n) - 3$  for  $n \geq 0$ .
5. Describe general properties of semi groups and Monoids.
6. (a) Convert the following infix expression into prefix and postfix expressions.  
 $A - B * C / (D - E) * F - G$ .  
 (b) Define Lattices and partially ordered sets.
7. Prove the following using the laws of Boolean Algebra.  
 (a)  $XY Z + XY Z + XY Z = Y$   
 (b)  $XY Z + XY Z + XY Z + XY Z = Z$   
 (c)  $Y (WZ + WZ) + XY = Y (W + X)$
8. Write short notes on any three of the following:  
 (a) Automatic reasoning  
 (b) The predicate calculus  
 (c) Theorem proving with reasoning  
 (d) Clausal forms.