

B. Tech Degree V Semester Examination, November 2009**CS 504 AUTOMATA LANGUAGES AND COMPUTATION***(1999 Scheme)*

Time : 3 Hours

Maximum Marks : 100

- I. (a) Prove the equivalence of NFA and DFA. (12)
 (b) Illustrate the concept of DFA with an example. (8)
- OR**
- II. (a) Prove the equivalence of NFA with and without E-moves. (14)
 (b) Illustrate the concept of E-closure with an example. (6)
- III. (a) State and prove the pumping lemma for regular sets. (10)
 (b) Discuss the applications of Finite Automata. (10)
- OR**
- IV. (a) State and prove Myhill-Nerode Theorem. (12)
 (b) Explain the following terms : -
 (i) Moore machines (4)
 (ii) Mealy machines (4)
- V. (a) Explain the following terms : -
 (i) Chomsky Normal Form
 (ii) Unit Productions (2 x 5 = 10)
 (b) Design a deterministic PDA corresponding to $L = \{ \omega C \omega^R \mid \omega \text{ is in } (0+1)^* \}$
 by empty stack. (10)
- OR**
- VI. Explain the following terms : -
 (i) Push down automata
 (ii) E-productions
 (iii) Greibach Normal Form
 (iv) Derivation tree (4 x 5 = 20)
- VII. (a) Explain the basic Turing Machine Model with a neat diagram. (10)
 (b) Write short notes on :
 (i) Multiple tracks
 (ii) Shifting over (2 x 5 = 10)
- OR**
- VIII. (a) Design a Turing Machine to accept the language $L = \{ 0^n \mid 1^n / n \geq 1 \}$ (10)
 (b) Explain the following terms : -
 (i) Non deterministic Turing Machine
 (ii) Storage in Finite Control. (2 x 5 = 10)
- IX. (a) Distinguish between recursive and recursively enumerable languages. (10)
 (b) Explain the following terms : -
 (i) Regular grammar
 (ii) Linear bound automata. (10)
- OR**
- X. (a) Show that if L has a regular grammar, then L is a regular set. (12)
 (b) Explain the four classes of languages (Chomsky Hierarchy) (8)

