

T. E. (Computer) (Sem-V) (Rev) 8/12/06
Theoretical Computer Science

Nov. 1 Pr. 117
Con. 4829-06.

YM-6709

(REVISED COURSE)

(3 Hours)

[Total Marks : 100

- N.B.** (1) Question No. 1 is compulsory.
(2) Attempt any four questions out of remaining six questions.
1. (a) Define formally a deterministic finite Automata DFA and non deterministic finite Automata (NFA). Prove their equivalence. 8
(b) Give regular expression, NFA and minimised DFA for the language over $(0, 1)$ having all strings such that the third symbol from the right end is zero. 12
 2. (a) Using pumping lemma, prove that the given language is not regular. 10
(i) $L_1 = \{ ww \mid w \in \{0, 1\}^* \}$
(ii) $L_2 = \{ 0^i 1^i \mid i \geq 1 \}$
(b) Design DFA that accept the following language : 10
(i) Set of all strings with odd number of 1's followed by even number of 0's $\Sigma = \{0, 1\}$
(ii) Set of all strings which begin and end with different letters $\Sigma = \{x, y, z\}$.
 3. (a) Compare Mealy and Moore machine. Design a Mealy machine to convert each occurrence of substring abb by aba. $\Sigma = \{a, b\}$ 10
(b) Find CFG for generating 10
(i) Strings containing alternate sequence of 0's and 1's, $\Sigma = \{0, 1\}$
(ii) Strings over $\Sigma = \{a, b\}$ with atleast two a's.
 4. (a) Construct PDA accepting- 10
 $L = \{ a^n b^m a^n \mid m, n \geq 1 \}$
(b) Convert the following grammar to CNF 10
 $S \rightarrow abAB$
 $A \rightarrow bAB \mid \epsilon$
 $B \rightarrow Baa \mid A \mid \epsilon$
 5. (a) Prove the variations and equivalence of Turing Machine. 10
(b) Design TM to accept the language- 10
 $L = \{ x \in \{0,1\}^* \mid x \text{ contains equal number of 0's and 1's} \}$. Simulate the operation for the string 110100.
 6. (a) Convert the given grammars to Greibach Normal form. 10
 $S \rightarrow SS \mid aSb \mid ab$.
(b) Construct right linear grammar and left linear grammar for the language $a(ba)^*$ 10
 7. Write short notes on : (any four) :- 20
(a) Closure properties of Regular Language.
(b) Halting Problem.
(c) Chomsky Hierarchy of Grammar.
(d) Myhill - Nerode's Theorem.
(e) Post's correspondence problem.