

(IT 312)

III/IV B.Tech. DEGREE EXAMINATION,
OCTOBER 2005.

First Semester

AUTOMATA THEORY AND FORMAL LANGUAGES

Time : Three hours

Maximum : 70 marks

All questions carry equal marks.

Answer Question No. 1 compulsorily. (1 × 14 = 14)

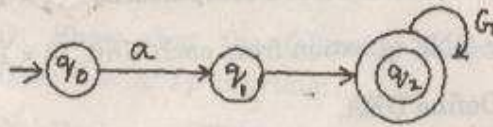
Answer ONE question from each Unit. (4 × 14 = 56)

1. (a) Define DEA.
- (b) What is the use of ϵ -move?
- (c) Define Regular set.
- (d) Is $(r^*)^* = r^*$?
- (e) Define CEL.
- (f) Define ambiguous grammar.
- (g) Define Parse tree.
- (h) Define recursively enumerable language.
- (i) Define C.S.L.
- (j) What are unit productions?
- (k) Define PDA.

- (l) Define Computable language.
- (m) State myhell - Nerode theorem.
- (n) Give any two closure properties of Regular sets.

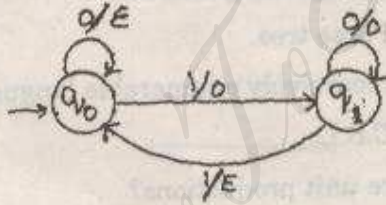
UNIT I

2. (a) Design an NFA to accept strings with 0's and 1's such that string contains two consecutive 0's or two consecutive 1's.
- (b) Convert the following NFA with ϵ moves to NFA without ϵ moves.



Or

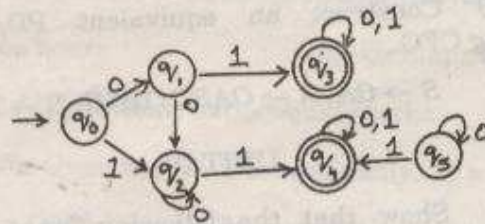
- (c) Construct equivalent NFA with ϵ transition for the following regular expression, $r = 0^* + 11$.
- (d) Convert the following mealy machine into equivalent moore machine.



UNIT II

3. (a) Show that $L = \{a^n b^n / n \geq 0\}$ is not regular by using pumping lemma.

(b) Construct minimum state automation equivalent to the transition diagram.



Or

(c) Construct CFG for the set of palindromes over alphabet $\{a, b\}$.

(d) Show that the grammar is ambiguous where $G = (\{ \epsilon \}, \{a, b, +, *\}, P, \epsilon)$ and productions P are $P: \epsilon + \epsilon / \epsilon * \epsilon / a / b$.

UNIT III

4. (a) Convert the following CFG into equivalent CMF $G = (V, T, P, S)$ where $V = \{S, A, B\}$, $T = \{a, b\}$ and productions are $S \rightarrow aAbB, A \rightarrow aA/a, B \rightarrow bB/b$.

(b) Find a Greibach Normal form grammar equivalent to the following CFG.

$$S \rightarrow AA/0, A \rightarrow SS/1$$

Or

(c) Design a deterministic pushdown Automata for the following language $L = \{0^n 1^{2n} / n \geq 1\}$.

(d) Construct an equivalent PDA for the following CFG.

$$S \rightarrow OA, A \rightarrow OABC/1B/O, B \rightarrow 1, C \rightarrow 2.$$

UNIT IV

5. (a) Show that the following language is not context free $L = \{a^p / p \text{ is prime}\}$.

(b) Design a T.M. to recognize all strings consisting of odd number of 1's.

Or

(c) Design a T.M. that computes $m+n$ for the given two positive integers m, n .

(d) Write short notes on Universal T using machine.