

[07 - 3113]

III/IV B.Tech. DEGREE EXAMINATION.

First Semester

Computer Science and Engineering

FORMAL LANGUAGES AND AUTOMATA THEORY

(Common with I.T.)

(Effective from the admitted batch of 2004-2005 and
after batches)

Time : Three hours

Maximum : 70 marks

First question is compulsory.

Answer any FOUR of the remaining questions.

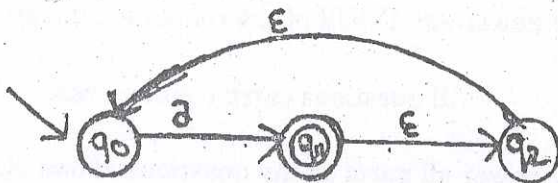
All questions carry equal marks.

Answer all parts of any questions at one place.

1. (a) Differentiate moore and mealy machines.
- (b) Give the regular expression for set of all strings whose 2nd symbol from right end is 1 and 4th symbol from right end is zero.
- (c) What is ambiguity in CFG?

- (d) Give the necessary conditions required for convert CFG to CNF.
- (e) Give the any four closure properties of CFL.
- (f) Define decidability and undecidability.
- (g) Write the ID of LBA.

2. (a) Construct DFA for the language L ,
 $L = \{w : |w| \bmod 5 \neq 0\}$ over the alphabet $\{a, b\}$.
- (b) Convert the following ϵ -NFA into DFA



3. (a) Construct right and left-linear grammar for the language $L = \{a^n b^m : n \geq 2, m \geq 3\}$.
- (b) Let R be a regular expression. Then there exists some non deterministic finite accepter that accepts $L(R)$. Consequently, $L(R)$ is regular language.

4. (a) Using pumping lemma for regular sets prove that $L = \{a^m b^n / m > n\}$ is not regular.

(b) Consider the grammar

$$S \rightarrow (L)/a$$

$$L \rightarrow L, S/S$$

Construct left most, right most and derivation trees for the following string $(a((a, a), (a, a)))$.

5. (a) Construct CNF for the following grammar

$$E \rightarrow E + T/T$$

$$T \rightarrow T * F/F$$

$$F \rightarrow (E)/a.$$

(b) Give the closure properties of CFL.

6. Give the CFG for odd palindrome over the alphabet $\{0, 1\}$ and design push down automate for the same.

7. (a) Design turing machine for accepting the strings with an equal number of 0's and 1's.

(b) Design turing machine that computes

$$f(m, n) = \begin{cases} m - n & \text{if } m \geq n \\ 0 & \text{otherwise} \end{cases}$$

8. (a) Explain about universal turing machine.

(b) Explain undecidability with suitable example.

[2542/4/II/12]