

(CS 325)

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

Second 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) Give an example for DFA.
- (b) What is meant by language accepted by DFA?
- (c) What is meant by ϵ -closure (q)?
- (d) What is meant by crossing sequence of 2DFA?
- (e) Define CFL.
- (f) Define undecidability.
- (g) Define PDA.
- (h) Define TM.
- (i) Write instantaneous description of T.M.
- (j) What is parse tree?
- (k) What is meant by ambiguous grammar?
- (l) Define compactable language.
- (m) Define universal Turing machine.
- (n) What is useless symbol?

UNIT I

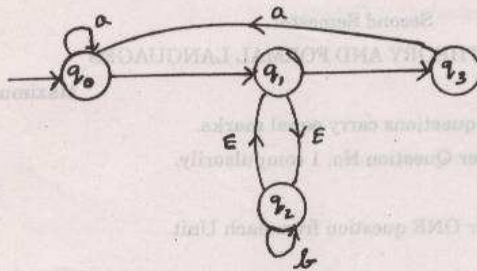
2. (a) Construct finite automata equivalent to the following regular expressions
 $01[(10)^* + 111]^* + 0]^* 1$.

- (b) Construct a DFA equivalent to the NFA $m = (Q, \Sigma, \delta, p, f)$ where $Q = \{p, q, r, s\}$
 $\Sigma = \{0, 1\}$, $F = \{s\}$ and δ is given by the table

	I	0	1
S			
p		{p,q}	p
q		r	r
r		s	—
s		s	s

Or

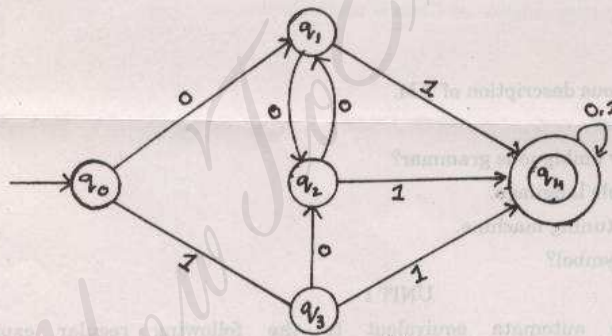
(c) Construct DFA for the NFA- ϵ shown below :



(d) Design a Moore machine to determine the residue mod 3 for each binary string treated as binary integer.

UNIT II

3. (a) Show that the set $L = \{0^i / i > 1\}$ is not regular.
 (b) Find the minimum state automaton for the following DFA :



Or

(c) Construct CFG generating the language $L = \{a^i b^j c^k / i = j + k\}$.

(d) Let G be the grammar

$S \rightarrow aB/bA$	
$A \rightarrow a/aS/bAA$	
$B \rightarrow b/bs/aBB$	

For the string $aaabbabbba$ find a

- (i) Left most derivation
 (ii) Right most derivation
 (iii) Parse tree.

UNIT III

4. (a) Find a grammar in CNF equivalent to the grammar $S \rightarrow N \sim S / [s \supset s] / p / q$ (s being the only variable).

(b) Find a grammar in CNF equivalent to the grammar

$$S \rightarrow AA/0$$

$$A \rightarrow SS/1.$$

Or

(c) Construct a PDA that accepts the language

$$L = \{w C w^r / w \in \{a, b\}^*\}$$

(d) Write CYK algorithm.

UNIT IV

5. (a) Write short notes on T.M.? And also give differences between a T.M. and P.D.A?

(b) Design a T.M. to accept the language $L = \{0^n 1^n / n \geq 1\}$.

Or

(c) Write short notes on Recursively enumerable language.

(d) Show that post correspondence problem is undecidable.

	1	0	1
0			
1			
0			
1			
0			