B.Tech. 5th Semester (Computer Science & Engg.)

Examination, December–2012

THEORY OF AUTOMATA COMPUTATION

Paper–CSE-305-F

Time allowed : 3 hours]   *[Maximum marks : 100*

Note : *Attempt any five questions.*

1. Explain the following :

   (a)   Partial function

   (b)   Define Regular Expression

   (c)   Limitation of FSM

   (d)   Relation between languages

   (e)   What do you mean by Σ^+

   (f)   Define ambiguity.

   (g)   What do you mean by PCP

   (h)   Define NFA and DFA mathematically

   (i)   Explain the ID in turing machine

   (j)   Application of PDA. $10\times2=20$

2. (a) Explain NFA significance and function. Convert the given Finite Automata into its Deterministic. Explain the method used. Taking given example prove both accept the same string.

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(b) Construct finite Automata to accept the regular expression $(0+1)^* (00+11) (0+1)^*$. Also discuss method used.   8

3. (a) Define Mealy and Moore Machine ? Construct a Mealy machine equivalent to the Moore Machine given by the following table 4

	a = 0 q_{i+1}	a =1 q_{i+1}	o/p
q_0	q_1	q_2	1
q_1	q_3	q_2	0
q_2	q_2	q_1	1
q_3	q_0	q_3	1

table 4

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(b) Construct the regular Expression accepted by the following Automata in fig. 2

fig -2 →
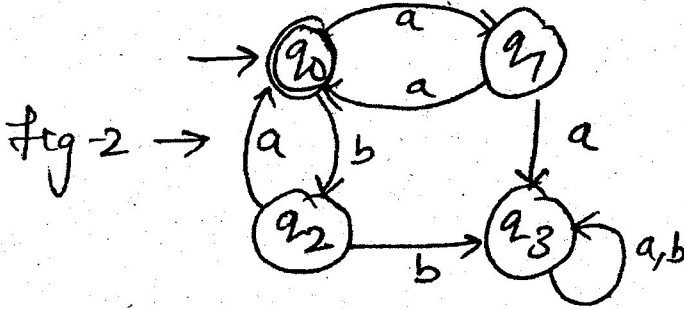
7

4. (a) List out closure properties of Regular sets. Also Discuss Proof. 10

   (b) What is Pumping Lemma ? Prove that $L = \{1^{n^2} \mid n \geq 0\}$ is not regular. 10

5. (a) Convert the following to GNF $S \rightarrow AB, A \rightarrow BS/b,$

   $B \rightarrow SA, A \rightarrow b$

   $B \rightarrow a$

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   (b) Define CFG and give examples. What is CFL generated by Grammer $S \rightarrow abB, A \rightarrow aa\,Bb$

   $B \rightarrow bb\,Aa, A \rightarrow \varepsilon$ (epsilon) 8

6. What do you mean by PDA ? How PDA are different from FA with the help of TD ? Also discuss some applications of PDA. Design a PDA for Balanced parentheses with transition diagram of PDA (TD) and test the string (( )). 20

7. Explain the ID and move of a Turing Machine ? Indicate the major differences between Turing Machine and PDA. Design Turing Machine to accept the language $L = \{0^n1^n \mid n >= 1\}$ 20

8. (a) Construct a grammer for the language

   $L = \{0^L1^{2i} \; i \geq 1$ 6

   (b) Discuss the Chomsky Hierarchy of Grammers. Also determine the type of the Grammer G which consist the productions

   (a) $S \to aA, A \to aAB, B \to b, A \to a$

   (b) $A \to aB; B \to aA, B \to b, A \to a$

   (c) $S \to aAB, AB \to bB, B \to b, A \to aB$

   (d) $S \to aAB, AB \to C, A \to b, B \to AB$ 14

9. (a) What is meant by recursive and recursively enumerable languages ? Prove that if language L and its complement I are both recursively enumerable then L is recursing. 14

   (b) Discuss Bimiting function in detail. 6