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23067

M. Tech. 1st Semester (Computer Engg.) Examination – December, 2014

MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

Paper : MTCE-603-A

Time : Three Hours] *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

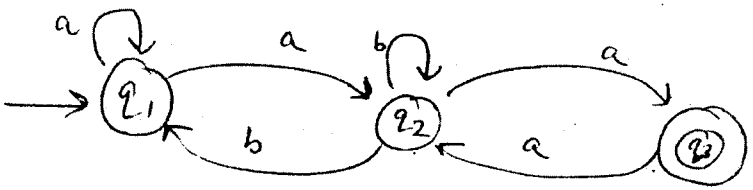
Note : Attempt any ***five*** questions. All questions carry equal marks.

1. (a) What is automation ? Explain its different characteristics.

(b) Construct a Mealy machine to following moore machine.

Present state	Next state		Out put
	a = 0	a = 1	
→ q_0	q_3	q_1	0
q_1	q_1	q_2	1
q_2	q_2	q_3	0
q_3	q_3	q_0	0

$(a + a(b + aa)^* b)^* a(b + aa)^* a$



5. (a) What is regular set ? What are its closure properties ?

(b) Find the regular expression equivalent to following subsets of {a,b}

(i) The set of al strings containing exactly 2a's

(ii) The set of al strings containing at least 2a's

(iii) The set of al strings containing at most 2a's

(iv) The set of al strings containing the substring aa

6. (a) Construct a PDA accepting

$L = \{wcw^R \mid \text{w is in} (0/1)^*\}$

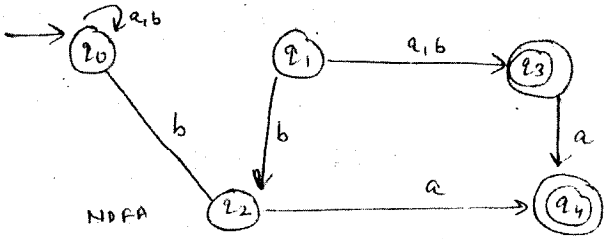
where W^R is reverse of w.

(b) Explain Rice's theorem in detail.

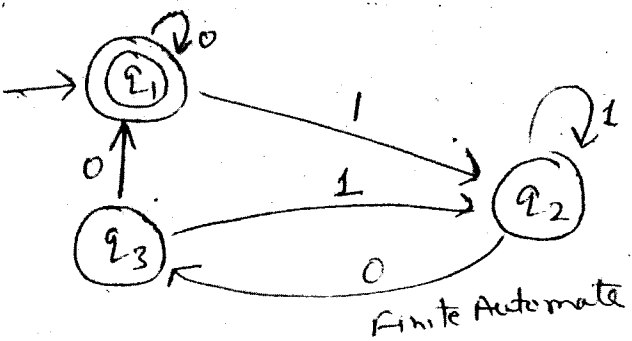
7. (a) Construct a PDA accepting

$L = \{a^n b^m a^n \mid m, n \geq 1\}$ by using Null store.

2. Construct a DFA equivalent to the NDFA (M) whose transition diagram is given below.



3. (a) Construct a regular expression corresponding to following finite automata.



(b) Construct a finite automata equivalent to regular expression

$$(0+1)^*(00+11)(0+1)^*$$

4. Explain Arden's theorem in detail. Calculating the following transition system given below and prove that strings recognized are.

(b) Design a Turing machine for multiplication of two numbers.

8. Write the short notes on the following :

(a) LBA

(b) Halting problem

(c) PCP

(d) GNF
