

Roll No. ....

2119

B. E. 4th Semester (CSE)

Examination – December, 2009

THEORY OF AUTOMATA & COMPUTATION

Paper : CSE-206-E

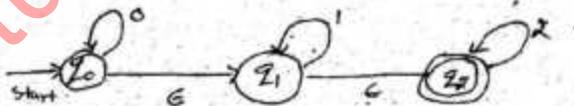
Time : Three hours ]

[ Maximum Marks : 100

Before answering the question, 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. Write the procedure to convert an NFA with  $\epsilon$ -moves to an equivalent NFA with at  $\epsilon$ -moves and apply it to the following NFA. 20



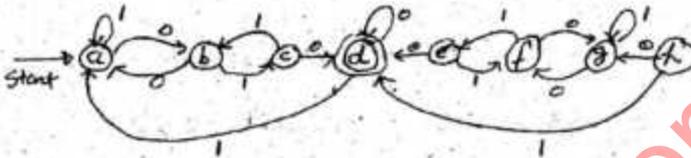
2. (a) Design a moose machine to get 1's complement of given binary number. 10

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c (b) Write and explain Arden's method to convert an NFA to DFA. 10

3. Write the algorithm to minimize the number of states of an DFA. Apply this algorithm on following DFA. 20



4. (a) Show that conversion to Chomsky Normal Form can square the number of productions in a grammar. 10

(b) Find a CFG with no useless symbols equivalent to 10

$$S \rightarrow AB/cA \quad B \rightarrow BC/AB$$

$$A \rightarrow a \quad C \rightarrow aB/b$$

5. Construct pushdown Automata for the following. 10 x 2

(a) to accept all the strings over alphabet {a, b} with exactly twice as many a's as b's.

(b) to accept the set of palindromes over {a, b}.

6. (a) Describe how a TM can simulate a two-stack automation. specifically, show that any language that can be accepted by two stack machine can also be accepted by a TM. 10

(b) What is halting problem for the TM ? What are its consequences. 10

7. Show that the context sensitive languages are closed under the following operations 20

- (a) Substitution
- (b) Intersection
- (c) Concatenation
- (d) Inverse homomorphism

8. Prove that the following functions are primitive recursive 20

- (a) Remainder function  $\text{rem}(x, y)$  which gives remainder when  $x$  is divided by  $y$ .
- (b) the function  $f(x \times y) = x * y$
- (c)  $\text{Sqrt}(x) = \sqrt{x}$