

BT-5/D06

8921

Automata Theory

Paper-CSE-305

Time : Three Hours]

[Maximum Marks : 100

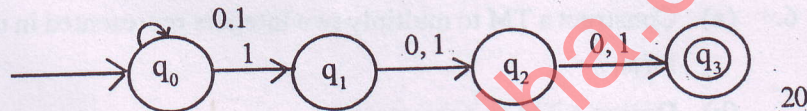
Note :- Attempt any FIVE questions. All questions carry equal marks.

1. (a) Define finite automata and construct an FA for the language L given below

$L = \{x \in (0,1)^*\} / x \text{ ends with } 1 \text{ and does not contain the substring } 00.$  10

- (b) Construct the FA from the following regular expression  
 $r = (11+110)^* 0.$  10

2. Write the algorithm to convert an NFA to DFA and convert the following NFA to DFA



3. (a) Prove that there exists an algorithm to determine whether or not  $L_1 = L_2$ , where  $L_1$  and  $L_2$  are two regular languages. 10
- (b) Write Myhill-Nerode theorem and its applications. 10
4. (a) Prove that the class of regular set is closed under complementation. 10
- (b) Prove that PRIME is nonregular (by pumping lemma) where  $\text{PRIME} = \{a^p \text{ where } P \text{ is a prime}\}.$  10
5. (a) Discuss Griebach Normal Form (GNF) and its applications. 10

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(b) Show that the following grammar is ambiguous –  
 $E \rightarrow I, E \rightarrow E + E, E \rightarrow E * E, E \rightarrow (E), I \rightarrow a/b/c.$  5+5

6. (a) Construct a TM to multiply two integers represented in unary form. 10  
(b) Design a TM to copy strings. 10
7. (a) Let  $F$  denote set of all functions from  $I \rightarrow I$ . Then there is some function in  $F$  that is not primitive recursive. 10  
(b) What do you mean by Push down stack memory machine ? Discuss its working and applications. 10
8. Write short notes on :
  - (a) CSL and CFL 10
  - (b) Grammar and CNF. 10