

1078

B.E. (Information Technology) Fifth Semester
ITE-546: Theory of Computation

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Part.

x-x-x

- I. (a) Give the regular expression for set of all strings ending in 00 over the $\{0, 1\}$.
 (b) State Church Turing Hypothesis.
 (c) Describe the Instantaneous Description of PDA.
 (d) State the Pumping lemma for CFG
 (e) What is recursively enumerable language?
 (f) What do you mean by unit production in context of CFG?
 (g) What is the relation between Linear Bounded Automata and Turing Machine?
 (h) What do you mean by equivalence of DFA and N DFA?
 (i) What is Arden's Theorem? Why we need it?
 (j) Define the context sensitive language. (1 * 10 = 10)

PART A

- II. (a) What do you mean by regular grammar? Show that the language L is not regular. (5)

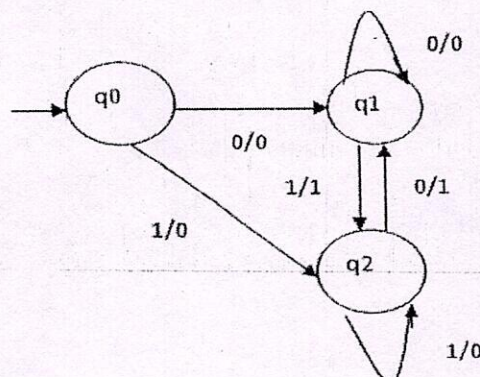
$$L = \{ a^n b^n : n \geq 0 \}$$

- (b) Construct a finite automaton equivalent to the regular expression R. (5)

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

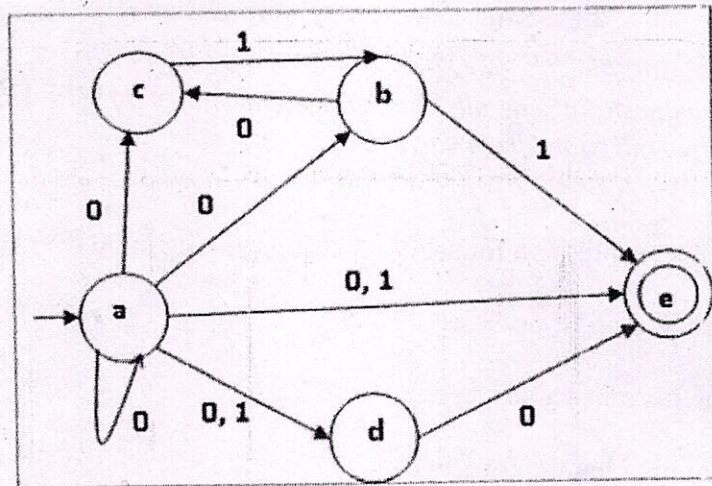
- III. (a) Differentiate between Mealy and Moore Machine. (4)

- (b) Construct a Moore machine equivalent to the Mealy machine shown below. (6)



IV. (a) Construct a DFA equivalent to the N DFA shown below.

(5)



(b) Design a DFA that accept the language L.

(5)

$$L = \{ ab^5wb^4 : w \in \{a, b\}^* \}$$

PART B

V. What is PDA? Design a PDA that accept all palindromes over {a, b}, also check the acceptability of string "aaabababaaa".

(10)

VI. Convert the following CFG into equivalent GNF.

(10)

$$E \rightarrow E + T / T$$

$$T \rightarrow T * F / F$$

$$F \rightarrow (E) / a$$

VII. Write short note on following

(a) Chomsky Classification of Languages

(5)

(b) Turing Machine and its Variants

(5)