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BTC-401

Roll No.

B. TECH. (CSE)

FOURTH SEMESTER END TERM EXAMINATION :
APRIL, 2010

THEORY OF AUTOMATA & COMPUTATION

Time : 3 Hrs.

Maximum Marks : 70

SECTION – A (30 Marks)

Attempt any 5 questions.

Each question carries 6 marks.

1. (a) Define a finite state machine and explain model, of finite automation. Define cellular Automata.

(3)

- (b) Explain the computability in context of Automata also differentiate the following Partial function, Total functions and Primitive recursive functions.

(3)

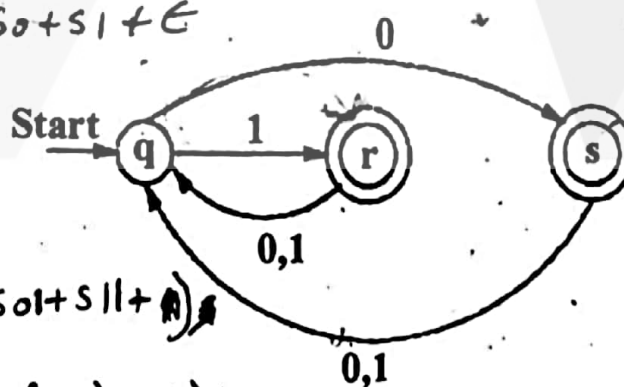
2. (a) Construct Regular Expression for the following finite automation. Also state and prove Arden's Theorem.

(4)

$$q = r0 + r1 + s0 + s1 + \epsilon$$

$$r = q1 + 1$$

$$s = q0$$



$$S = (S(01+11)^* + 1(01+11)^*)^*$$

$$r = (r0 + r1 + s0 + s1 + 1)$$

$$r = (r(0+1) + s(0+1) + 1)$$

$$r = (s(01+11) + 1)(01+11)^* \quad (361)$$

$$S = r00 + r10 + s00 + s10 + 0$$

P.T.O.

SECTION - B

(20 Marks)

Attempt any 2 questions.

Each question carries 10 marks.

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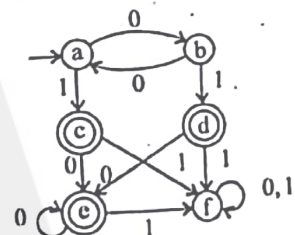
5

	0	1
$\rightarrow q_0$	(q_0, R)	(q_1, R)
$* q_1$	(q_1, R)	(q_2, L)
q_2	(q_0, R)	(q_2, L)

(4)

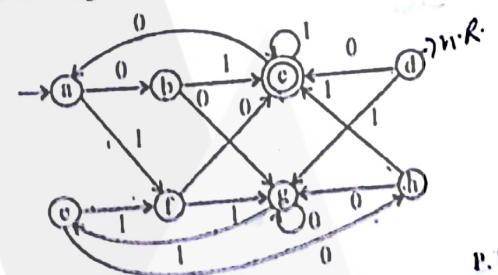
(ii) What is Linear Bounded Automata (LBA)? Explain its importance in context of context Sensitive Language. (3)

9. (a) State and prove My-Hill-Nerode Theorem and apply My Hill Nerode Theorem on the following: (6)



(6)

(b) Construct Minimum State Automata from the following Automata. (4)



(361)

P.T.O.

7. (a) Construct a Pushdown automata for language $L = \{a^n b^n c^n d^n : m, n \geq 1\}$

$S \rightarrow a b d / B$
 $B \rightarrow b b c / b c$ (4)

(b) Construct CFG from the following PDA

$A = (\{q_0, q_1\}, \{a, b\}, \{a, z_0\}, \delta, q_0, z_0, \phi)$ δ is gives as

$\delta(q_0, a, z_0) = \{(q_0, a z_0)\}$

$\delta(q_0, a, a) = \{(q_0, a a)\}$

$\delta(q_0, b, a) = \{(q_1, a)\}$

$\delta(q_1, b, a) = \{(q_1, a)\}$

$\delta(q_1, a, a) = \{(q_1, \epsilon)\}$

$\delta(q_1, \epsilon, z_0) = \{(q_1, \epsilon)\}$

(6)

8. (a) Convert the following grammar into CNF.

$S \rightarrow a A D$

$A \rightarrow a B / b A B$

$B \rightarrow b$

$D \rightarrow d$

(3)

(b) Differentiate 2DFA and DFA. Write down the crossing sequences for the string 101001 and 2DFA given below

(361)

SECTION - C (Compulsory)

(20 Marks)

10. (a) Explain decision algorithms for context free language. Explain CYK Algorithm and check the membership and also construct the matrix of the input string baaba for the grammar.

$$S \rightarrow AB/BC$$

$$A \rightarrow BA/a$$

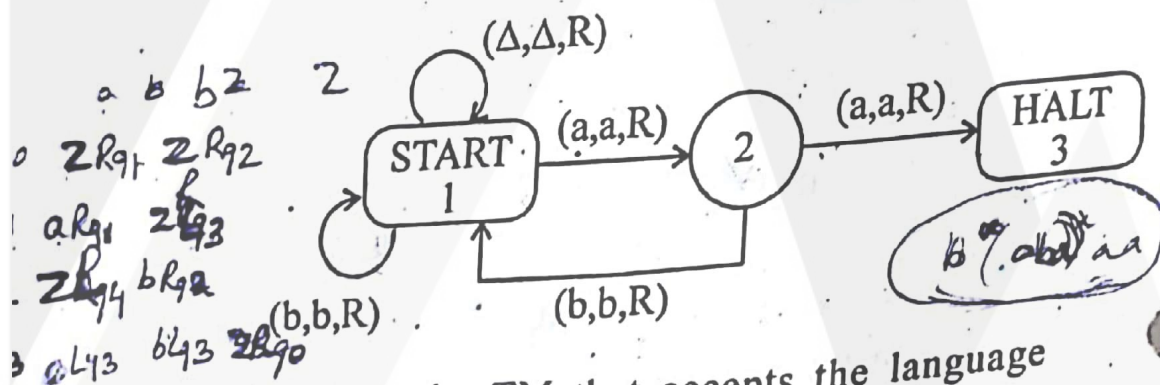
$$B \rightarrow CC/b$$

$$C \rightarrow AB/a$$

(1+2+3)

- (b) What do you mean by Undecidability? Explain the Halting problem of Turing Machine and also explain within it is solvable or not. Write down the language accepted by the following:

(2+2+2)



- (c) Describe the TM that accepts the language $L = \{w \in \{a, b\}^* \mid w \text{ contains equal number of } a\text{'s, } b\text{'s}\}$.

Also derive the computation sequence for the input sequence aabb. (4)

- (d) What do you mean by MPCP? Show that the post correspondence problem with two lists $A = \{11, 100, 111\}$ and $B = \{11, 001, 11\}$ has a solution and give the solution. (4)