6E3203

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B.Tech VI Semester (Main/Back) exam. May, 2012

Computer Engg.

6CS3 Theory of Computation

Common to CS & IT

Time : 3 Hours   **Maximum Marks : 80**

Min. Passing Marks : 24

Instructions to Candidates:

Attempt any five questions, selecting one question from each unit. All Question carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.

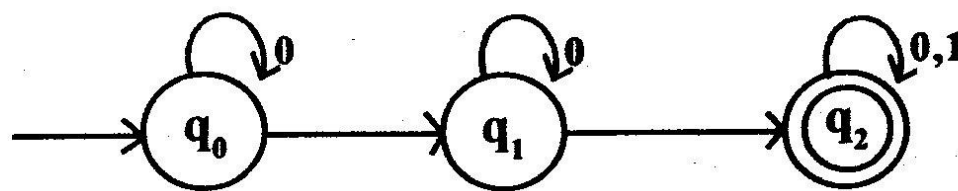*Units of quantities used/ calculated must be stated clerly.*

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1._____**Nil**_____   2._____**Nil**_____

Unit-1

1. (a) What is Automata? Explain finits Automata with neat & labeled diagram. Also check acceptability of string 101101 for the given Automata.   8
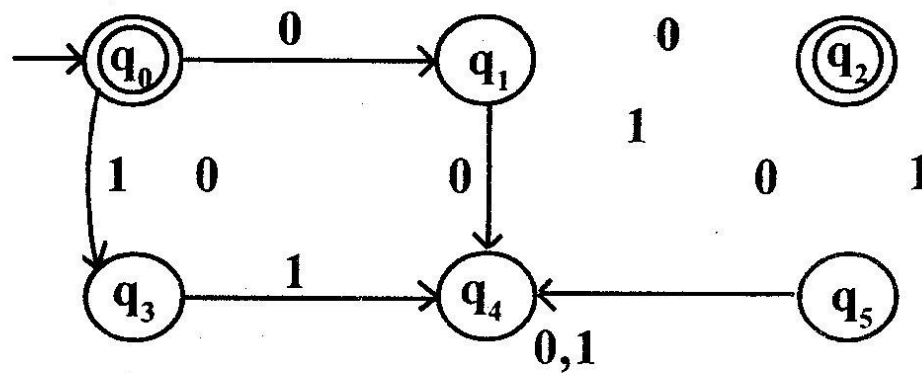

(b) Construct a Moore machine equivalent to the Mealy machine M defined by the table given below :   8
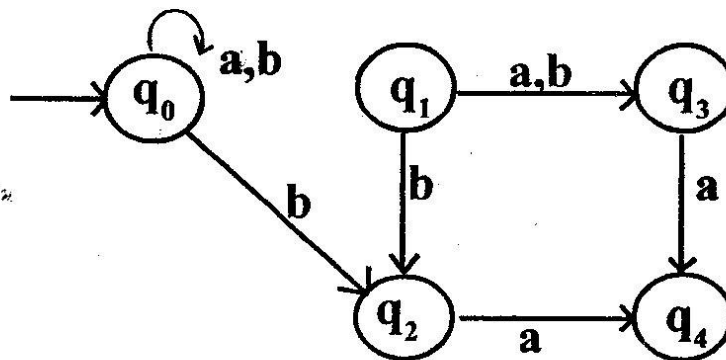
Present state	Next state			
	a=o		a=1	
	state	o/p	state	o/p
q_1	q_1	1	q_2	0
q_2	q_4	1	q_4	1
q_3	q_2	1	q_3	1
q_4	q_3	0	q_1	1

Or

1   (a)   Construct a minimum state automata equivalent to the DFA described by the figure given below :   8

(b)   Construct a DFA equivalent to the NDFA M where transition diagram is given below: 8

Unit - II

.2.   (a)   What is Myhill-Nerode theorem. Explain. Also prove that L is regular language, if L consisting of all strings over {a,b}.   8

(b)   Consider DFA m= ({q_0,q_1,,q_2},{a,b},s,q_0,{q_1,,q_2}) such that s(q_0,a) = q_2,s(q_1,b) = q_1,s($q_,$,a) =q_0,s(q_1,b) =q_1, s(q_2,a) =q_2, s(q_2,b) =q, find out regular expression for the language accepted by M. Also express the language.   8

2. (a) State and explain pumping lemma. Prove that the following language L= $\{a^n: n$ is a perfect square$\}$ is not regular. 8

   (b) Construct a finite automata equivalent to the regular expression 8

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

Unit - III

3. (a) Convert the grammar

   S $\longrightarrow$ AB

   A   Bs/b

   B   SA/a   into   GNF   8

   (b) Convert the given PDA to CFG

   $A=(\{q_0,q_1,\},\{a.b\},\{z_0,z\},s,q_0,z_0 \phi)$

   S Ps given by

   $S (q_0,b,z_0) = (q_0,zz_0)$

   $S (q_0,n,z_0) = (q_0,n)$

   $S (q_0,b,z) = (q_0,zz)$

   $S (q_0,a,z) = (q_1,z)$

   $S (q_0,b,z) = (q_1,n)$

   $S (q_1,a,z_0) = (q_0,z_0)$ 8

3. (a) What is PDA, Explain. Construct PDA equivalent to

   L= $\{a^n b^{n+m} a^m / n,m \geq 0\}$ 8

(b) Reduce the grammar to CNF

  S aB/ab

  A aAB/a

  B ABb/b   8

Unit-4

4. (a) Write Short note on:
    (i) Universal turing Machine

    (ii) Halting problem

    (iii) Multitape and multi dimensional turing machine [4x3=12]

 (b) Design turing machine M that recognize the language $\{a^n b^n c^n /n \geq 1\}$
                         4

Or

4. (a) Explain turing machine with its various ways of representation. Draw diagram wherever required. 8

 (b) Design turing machine M that recognize the language

  $\{0^n 1^n /n \geq 1\}$ 8

Unit-5

5. (a) Explain the model of linear bounded Automata. 8

 (b) Explain cromsky classification of language. 8

Or

5. Write short note on the following:

  (i) Recursive and recursively enumerable language.

  (ii) Content free grammar and content sensitive language.

  (iii) Linear bounded automata.   (6+5+5)