

6E3203

Roll No. _____

Total No of Pages: 4

6E3203
B.Tech VI Sem. (Main & Back) Exam. May- 2013
Computer Engg.
6CS 3 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 questions 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 clearly.

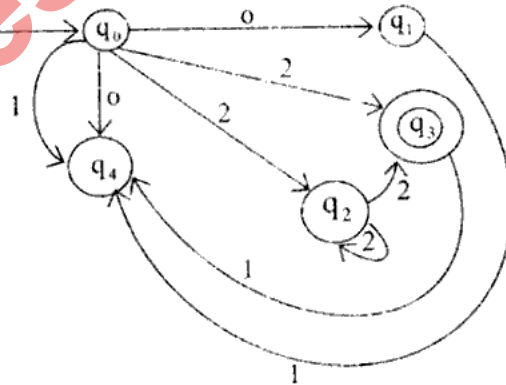
Use of following supporting material is permitted during examination.

1. _____

2. _____

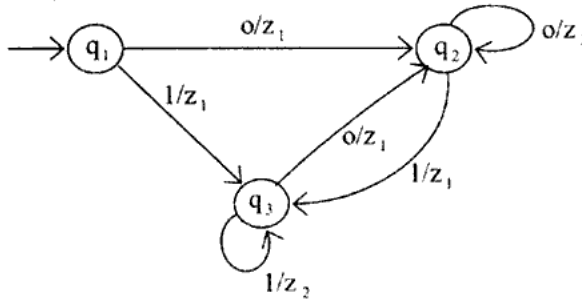
UNIT - I

- Q1. (a) Explain the procedure for minimization of finite auto mata with example. [8]
(b) Construct a deterministic finite auto mata equivalent to following N DFA. [8]



OR

- Q1. (a) Consider a Mealy Machine given by transition diagram. Construct a Moore Machine equivalent to this Mealy Machine. [8]



- (b) Construct a transition system which accepts set of string over $\epsilon = \{0, 1\}$ and is with even no. of zeros and even no. of ones. Also find the acceptability of string 110101. [8]

UNIT - II

- Q2. (a) Explain Chomsky classification of language with the help of suitable example. [8]
 (b) Find the regular grammar corresponding to regular expression $(011+1)^* (01)^*$ [8]

OR

- Q2. (a) Write closure property of regular set. [4]
 (b) Show that $L = \{a^n b^n : n \geq 1\}$ is not regular using Mayhill - Nerode theorem. [6]
 (c) Explain the application of pumping lemma with an example. [6]

UNIT - III

- Q3. (a) Define Chomsky Normal Form (CNF) for context free grammar. Reduce the following grammar to Chomsky Normal Form. [8]

$$G = (\{s\}, \{a, b, c\}, \{s \rightarrow a/b/css\}, s)$$

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[12980]

- (b) The production of any grammar ϵ is given by

$$S \rightarrow 0B/1A \quad , \quad A \rightarrow 0/0S/1AA$$

$$B \rightarrow 1/1S/0BB.$$

For the string 00110101, find leftmost derivation, rightmost derivation and derivation tree. [8]

OR

- Q3. (a) How can a pushdown auto mata be constructed for a given language? Explain with example. [8]
 (b) Explain the steps involving in conversion from context free grammar to pushdown auto mata with example [8]

UNIT - IV

- Q4. (a) Write short note on following:- [8]
 (i) Linear bounded auto mata (ii) Universal Turing Machine
 (b) Design a Turing Machine M to recognize the language $\{1^n 2^n 3^n / n > 1\}$ [8]

OR

- Q4. (a) Explain the following : [8]
 (i) Turing Machine (ii) Recursive and recursive enumerable language
 (b) Ackermann's function is defined by
 $A(0, y) = y+1, \quad A(x+1, 0) = A(x, 1)$
 $A(x+1, y+1) = A(x, A(x+1, y))$
 Compute (i) $A(1, 1)$ (ii) $A(2, 1)$ (iii) $A(1, 2)$ [8]

UNIT - V

Q5. Prove the following closure properties of context sensitive language [4x4=16]

- (a) Union (b) Intersection (c) Complementation (d) Transpose

OR

Q5. (a) Which of the following are context sensitive grammar?

Given $V_N = \{S, A, B, D\}$

[16]

$\Sigma = \{0, 1, a, bc\}$, A is start symbol

- (a) $A \rightarrow BB$
(b) $A \rightarrow 0B$
(c) $SA \rightarrow S0A$
(d) $SAB \rightarrow S0A1$
(e) $aABbcD \rightarrow abcDbcd$
(f) $01 \rightarrow 10$
(g) $aBA bCD \rightarrow abcD bcD$
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