

6E3203

B.Tech. (VI Sem.) (Main and back) Examination, May 2013

Computer Engineering

6CS3 THEORY OF COMPUTATION

Common to CS and IT

Maximum Marks: 80

Min. Passing Marks: 24

Time: 3 Hours

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.

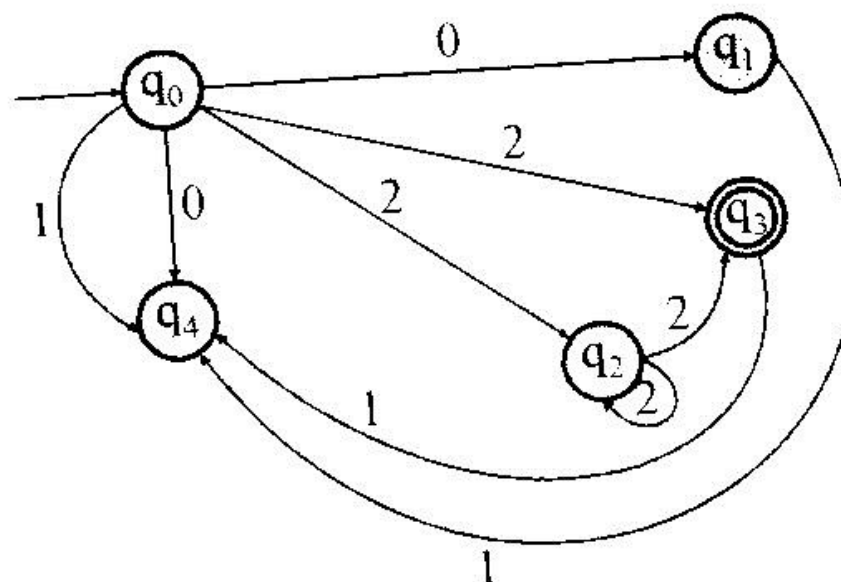
Use of following supporting material is permitted during examination.

1. _____

2. _____

Unit-I

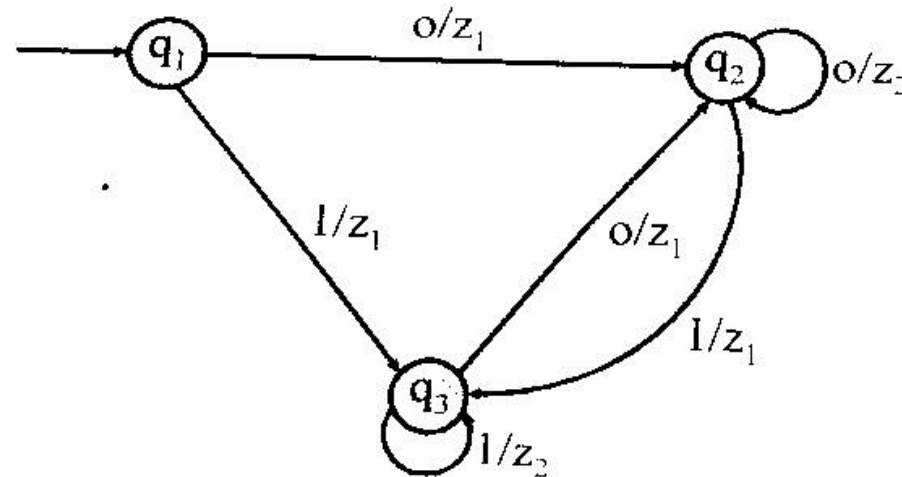
- Q.1 (a) Explain the procedure for minimization of finite automata with example. [8]
(b) Construct a deterministic finite automata equivalent to following N DFA. [8]



Figure

OR

- Q.1 (a) Consider a Mealy Machine given by transition diagram. Construct a Moore Machine equivalent to this Mealy Machine. [8]



Figure

- (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

- Q.2 (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

- Q.2 (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

- Q.3 (a) Define Chomsky Normal Form (CNF) for context free grammar. Reduce the following grammar to Chomsky Normal Form.

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

[8]

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

$$S \rightarrow 0B/1A$$

$$A \rightarrow 0/0S/1AA$$

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

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

OR

- Q.3 (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 automata with example. [8]

Unit-IV

Q.4 (a) Write short note on following:

- (i) Linear bounded automata (ii) Universal Turing Machine

(b) Design a Turing Machine M to recognize the language $\{1^n, 2^n, 3^n/n \geq 1\}$. [8]

OR

Q.4 (a) Explain the following:

(i) Turing Machine

(ii) Recursive and recursive enumerable language [8]

(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

Q.5 Prove the following closure properties of context sensitive language. [4×4=16]

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

OR

Q.5 (a) Which of the following are context sensitive grammar?

Given

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

$$S = \{0, 1, a, b, c\}, A \text{ is star symbol}$$

(a) $A \rightarrow BB$

(b) $A \rightarrow 0B$

(c) $SA \rightarrow SOA$

(d) $SAB \rightarrow SOA1$

(e) $aABbcd \rightarrow abcDbcd$

(f) $01 \rightarrow 10$

(g) $aBA bCD \rightarrow abcd bcd$