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Roll No. :

333556(33)

B. E. (Fifth Semester) Examination, Nov.-Dec. 2021

(New Scheme)

(IT Engg. Branch)

THEORY of COMPUTATION

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Each part (a) is compulsory and from parts (b), (c) and (d), attempt any two part. Part (a) carries 2 marks and part (b), (c) and (d) each one carries 7 marks.

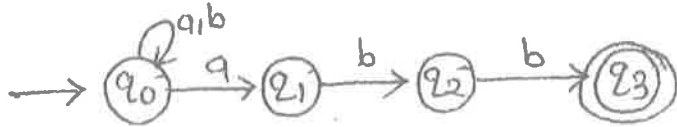
Unit-I

1. (a) Explain deterministic Finite Automata. 2
- (b) Consider a NFA in fig. Find its DFA. 7

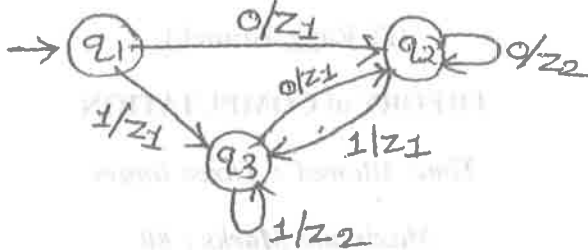
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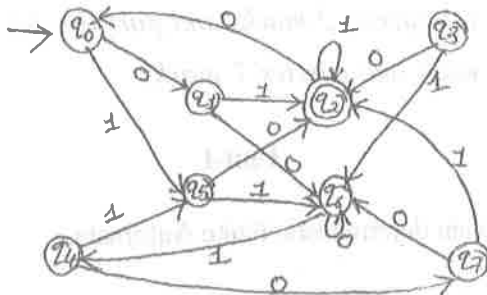
[2]



- (c) Consider a Mealy machine shown in below figure.
Construct a Moore machine equivalent to this Mealy machine. 7



- (d) Construct a minimum state automation equivalent to the finite automation given in below figure. 7

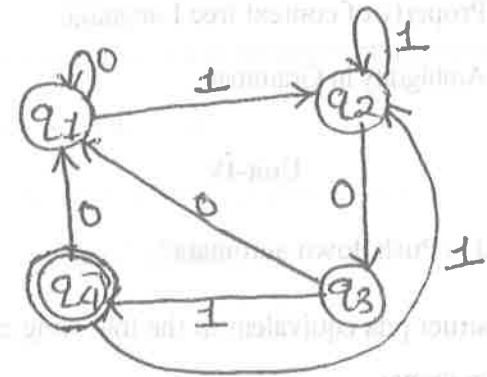


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[3]

Unit-II

2. (a) Find a regular expression for all words that contain at least two a's or two b's. 2
 (b) Construct a DFA with reduced states equivalent to the regular expression $10 + (0+11)0^*1$. 7
 (c) Find the regular expression corresponding to given figure. 7



- (d) Show that the set $L = \{ a^{iz} \mid i \geq 1 \}$ is not regular. 7

Unit-III

3. (a) Let G is given by $S \rightarrow aS \mid a$, construct a transition system M accepting $L(G)$. 2

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(b) Construct reduced grammar equivalent to the grammar

$$S \rightarrow aAa, A \rightarrow Sb \mid bCC \mid DaA, C \rightarrow abb \mid DD, \\ E \rightarrow aC, D \rightarrow aDA. \quad 7$$

(c) Construct a grammar in Greibach Normal form equivalent to the grammar $S \rightarrow AA \mid a, A \rightarrow SS \mid b.$ 7

(d) Write brief discription about : $3\frac{1}{2}+3\frac{1}{2}$

- (i) Property of context free Language
- (ii) Ambiguity in Grammar

Unit-IV

4. (a) What is Push down automata? 2

(b) Construct pda equivalent to the following context free grammar

$$S \rightarrow OBB \quad B \rightarrow OS \mid IS \quad | O \text{ test whether } 010^4 \text{ is in } N(A). \quad 7$$

(c) Design a Turing Machine that accepts

$$\{ 0^n 1^n \mid n \geq 1 \} \quad 7$$

[5]

(d) Write short notes on :

$3\frac{1}{2} \times 2$

- (i) Church's Hypothesis
- (ii) Universal Turing Machine

Unit-V

5. (a) Show that the function

$$f(x, y) = x + y \text{ is primitive recursive.} \quad 2$$

(b) Explain the Turing Model for computation. 7

(c) Explain recursive and recursive enumerable sets. 7

(d) Write short notes on : $3\frac{1}{2} \times 2 = 7$

- (i) Space and time complexity of FA
- (ii) NP-completeness