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322554(22)

B. E. (Fifth Semester) Examination, April-May/Nov.-Dec. 2020

(New Scheme)

(CSE Engg. Branch)

THEORY OF COMPUTATION

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : *Part (a) is compulsory from each unit. Attempt any two parts from (b), (c) and (d) from each unit.*

Unit-I

1. (a) Define Finite Automation. 2

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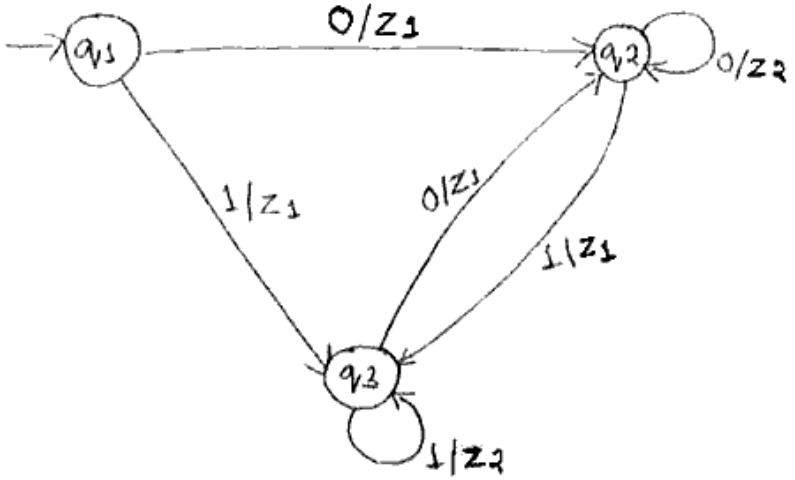
(b) Construct a deterministic finite automation equivalent to $M = (\{q_0, q_1, q_2, q_3\}\{0, 1\}, \delta, q_0, \{q_3\})$ where transition is given by table : 7

State/ Σ	a	b
$\rightarrow q_0$	$q_0 q_1$	q_0
q_1	q_2	q_1
q_2	q_3	q_3
(q_3)		q_2

(c) Consider a nearly machine represent by given figure. Construct a Moore Machine equivalent to this Mealy machine. 7



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(d) Write the difference between NDFA and DFA. 7

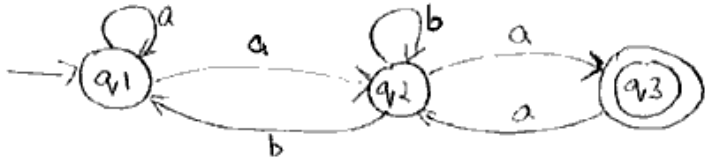
Unit-II

2. (a) Define Regular Expression. 2

(b) Construct a DFA with reduced states equivalent to the regular expression i.e. 10 + (0+11) 0*1. 7

(c) Consider the transition system given in figure. Prove that the strings recognized are $(a+a(b+aa)^*b)^*$

$a(b+aa)^*a$ 7



(d) Prove that following Language is not regular

$L=\{0^i\ 1^i / i \geq 1\}$

Unit-III

3. (a) Define Grammar. 2

(b) Consider the following grammar and generate the left must derivation and right most derivation for the string "*aaa bbabbba*"

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$G=(\{S,B,A,\{a,b\},P,S\})$ = where

P includes

$S \rightarrow aB / bA$

$A \rightarrow a / aS / bAA$

$B \rightarrow b / bS / aBB$

(c) Consider the context free grammar G where $S \rightarrow AB$, $A \rightarrow a$, $B \rightarrow C/b$, $C \rightarrow D$, $D \rightarrow E$, $E \rightarrow a$. Eliminate all unit productions. 7

(d) Convert CGF into CNF form which is given below

$S \rightarrow bAc/aB$, $A \rightarrow bAA/aS/a$, $B \rightarrow aBB/bS/b$ 7

Unit-IV

4. (a) Define Push Down Automata. 2

(b) Design a PDA which accepts $L=\{a^nb^n / n \geq 0\}$. 7

(c) Design a turing machine M that recognizes the language 7

$$L=\{a^nb^nc^n / n \geq 1\}$$

(d) Write short notes on : 7

(i) Church's Hypothesis

(ii) Halting problem of turing machine

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Unit-V

5. (a) Define Partial and Initial function. 2

(b) Explain recursive and recursive enumerable language with example. 7

(c) Write short notes on : 7

(i) NP-completeness

(ii) Space & Time complexity

(d) What is computation? Explain turing model for computation. 7

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