

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.

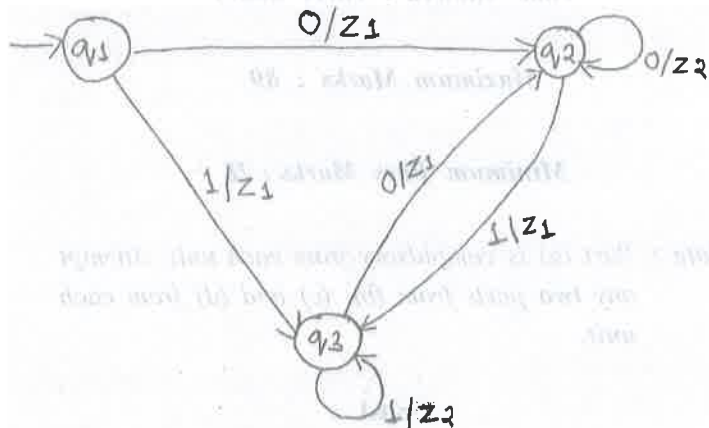
2

[2]

(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 :

State/ Σ	a	b
$\rightarrow q_0$	q_0q_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.



[3]

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

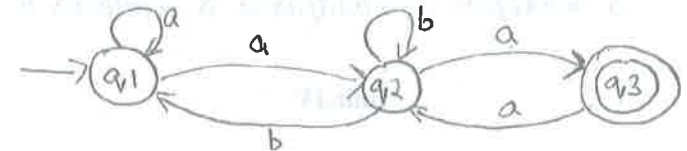
Unit-II

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 most derivation and right most derivation for the string "aaa bbabbba"

[4]

$G = (\{S, B, A, \{a, b\}, P, S\}) =$ 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 $L = \{a^n b^n / n \geq 0\}$. 7

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

$L = \{a^n b^n c^n / n \geq 1\}$

(d) Write short notes on : 7

(i) Church's Hypothesis

(ii) Halting problem of turing machine

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[5]

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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