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SIDDHARTH INSTITUTE OF ENGINEERING &amp; TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech III Year I Semester Supplementary Examinations December-2021

FORMAL LANGUAGES AND AUTOMATA THEORY

(Common to CSE &amp; CSIT)

Time: 3 hours

Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

**UNIT-I**

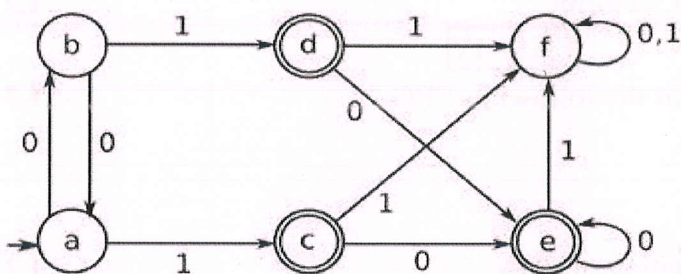
- 1 a Convert the following Mealy machine into its equivalent Moore machine. L2 10M

Present State	I/P=0		I/P=1	
	Next State	O/P	Next State	O/P
→ A	C	0	B	0
B	A	1	D	0
C	B	1	A	1
D	D	1	C	0

- b Show that  $(0^*1^*)^* = (0+1)^*$ . L3 2M

OR

- 2 a Minimize the following finite automata. L3 10M



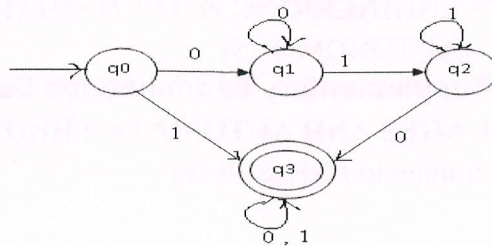
- b Define NFA. What are the differences between DFA & NFA. L2 2M

**UNIT-II**

- 3 a Prove that the language  $L = \{a^n b^n c^n \mid n \geq 1\}$  is not regular using pumping lemma. L3 10M
- b Prove  $R = Q + RP$  has unique solution,  $R = QP^*$ . L1 2M

OR

- 4 a Explain about the Arden's theorem, for constructing the RE from a FA with an example. L1 7M



- b List out the identities of Regular expression. L1 5M

## UNIT-III

- 5 a Remove the unit production from the grammar. L3 6M  
 $S \rightarrow AB, A \rightarrow E, B \rightarrow C, C \rightarrow D, D \rightarrow b, E \rightarrow a$
- b Remove  $\epsilon$  productions from the grammar L3 6M  
 $S \rightarrow ABaC, A \rightarrow BC, B \rightarrow b/\epsilon, C \rightarrow D/\epsilon, D \rightarrow d$

OR

- 6 a Write the procedure and Eliminate left recursion from the following Grammar L2 8M

$$E \rightarrow E+T/T$$

$$T \rightarrow T * F / F$$

$$F \rightarrow (E) / \text{id}$$

- b Explain Left recursion and Left factoring L2 4M

## UNIT-IV

- 7 a Construct an equivalent PDA for the following CFG L3 7M  
 $S \rightarrow aAB \mid bBA$   
 $A \rightarrow bS \mid a$   
 $B \rightarrow aS \mid b$

- b Explain about the graphical notation of PDA. L2 5M

OR

- 8 Explain Deterministic Push down Automata with example? L2 12M

## UNIT-V

- 9 a Explain the various types of Turing machine. L3 10M  
 b Describe linear bounded automaton. L3 2M

OR

- 10 a Construct a Turing machine that recognizes the language  $a^n b^n c^n$ . L3 8M  
 b Write about Universal Turing machine. L3 4M

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