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Course Code: 201CS4T05

ADITYA ENGINEERING COLLEGE (A)

FORMAL LANGUAGES AND AUTOMATA THEORY

(Common to CSE & IT)

Time: 3 hours

Max. Marks: 70

Answer ONE question from each unit

All Questions Carry Equal Marks

All parts of the questions must be answered at one place only

UNIT – I

- 1 a Define Alphabet, String and Language. K1 CO1 [5M]
- b Design a DFA, that accepts all strings of a Language L, with even 0's and even 1's over $\{0, 1\}$. K3 CO1 [9M]

OR

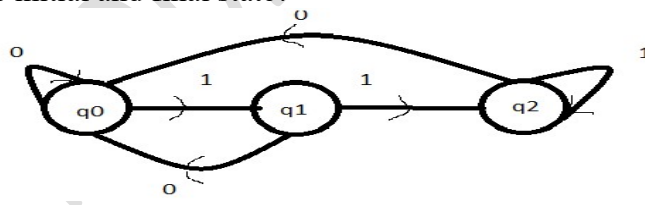
- 2 a Construct a Moore machine for a given Mealy machine? K2 CO1 [7M]

Q	0	Δ	1	Δ
$\rightarrow Q_0$	Q_1	N	Q_2	N
Q_1	Q_2	Y	Q_1	N
Q_2	Q_1	N	Q_2	Y

- b Convert the NFA-epsilon into DFA with suitable example. K2 CO1 [7M]

UNIT – II

- 3 a Demonstrate basic operations of Regular Expressions. K2 CO2 [7M]
- b Derive the regular expression for the following finite automata where q_0 is the initial and final state? K2 CO2 [7M]



OR

- 4 a Prove that a Language is not regular using pumping lemma. K3 CO2 [7M]
- b Explain about closure properties of regular sets. K2 CO2 [7M]

UNIT – III

- 5 a Illustrate Context Free Grammar with suitable example. K2 CO3 [7M]
- b Construct LMD, RMD and Parse tree for the string: (id+id*id) using the CFG $E \rightarrow E+E/E*(E)/id$. K3 CO3 [7M]

(P.T.O)

OR

- 6 a Simplify the following CFG and Convert it into CNF
 $S \rightarrow AaB \mid aaB, A \rightarrow \epsilon, B \rightarrow bbA \mid \epsilon$ K4 CO3 [7M]
b Show that language $L = \{a^n b^n c^n \mid n \geq 0\}$ is not a Context Free. K2 CO3 [7M]

UNIT – IV

- 7 a What is Deterministic PDA? Differentiate acceptance by final state and acceptance by empty stack. K2 CO4 [7M]
b Construct a deterministic PDA for accepting language $L = \{0^n 1^n \mid n \geq 1\}$ K3 CO4 [7M]

OR

- 8 a Explain the about various components of PDA. K2 CO4 [5M]
b Show Equivalence of Pushdown Automata and Context Free Grammars K3 CO4 [9M]

UNIT – V

- 9 a Design a Turing Machine to accept the language $L = \{WW^R \mid W \in (a+b)^*\}$ K3 CO5 [7M]
b Define Post Correspondence Problem? Explain in brief about PCP with an example? K2 CO5 [7M]

OR

- 10 a Explain about Classes of P and NP, NP- Hard and NP Complete problems. K2 CO5 [7M]
b Design a Turing Machine to accept the language $L = \{0^n 1^n 2^n \mid n \geq 0\}$ K3 CO5 [7M]
