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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR  
(AUTONOMOUS)

B.Tech II Year II Semester Supplementary Examinations February-2022

FORMAL LANGUAGES AND AUTOMATA THEORY

(Common to CSE &amp; CSIT)

Time: 3 hours

Max. Marks: 60

**PART-A**

(Answer all the Questions 5 x 2 = 10 Marks)

- 1 a Define Grammar? List the tuples with proper notations. 2M  
 b State Arden's theorem 2M  
 c Define Ambiguous grammar with one example? 2M  
 d A PDA is more powerful than a finite automaton. Justify this statement. 2M  
 e Define Universal turing machine 2M

**PART-B**

(Answer all Five Units 5 x 10 = 50 Marks)

**UNIT-I**

- 2 a Define NFA and DFA. Construct DFA for the given NFA 7M

	Next state	
	0	1
→ q0	q0, q1	q0
q1	q2	q1
q2	q3	q3
Ⓠ q3	-	q2

- b Define relations on set and explain its property with an example 3M

**OR**

- 3 Convert the following Mealy machine into its equivalent Moore machine 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

**UNIT-II**

- 4 Prove that the language  $L = \{a^n b^n \mid n \geq 1\}$  is not regular using pumping lemma with procedure 10M

**OR**

- 5 a Construct the Regular Grammar for the given Regular Expressions 6M  
 i)  $ab(a+b)$       ii)  $a^*(a+b)b^*$   
 b Prove  $R=Q+RP$  has unique solution,  $R=QP^*$  4M

**UNIT-III**

- 6 a Convert the following grammar into CNF. 6M  
 $S \rightarrow bA/aB$      $A \rightarrow bAA/aS/a$      $B \rightarrow aBB/bS/a$
- b What is linear grammar? Explain in detail with example 4M

**OR**

- 7 Simplify the following CFG  $S \rightarrow 0A \mid 1B \mid C$ ,  $A \rightarrow 0S/00$ ,  $B \rightarrow 1/A$ ,  $C \rightarrow 0/1$  10M

**UNIT-IV**

- 8 a Construct a PDA which recognizes all strings that contain equal number of 0's and 1's 6M  
b Write the process for convert PDA into an equivalent CFG 4M

**OR**

- 9 Explain Deterministic Push Down Automata with example 10M

**UNIT-V**

- 10 Construct a Turing machine that recognizes the language  $a^n b^n c^n$  10M

**OR**

- 11 Explain conversion of regular Expression to TM with example 10M

**\*\*\*END\*\*\***