

Reg. No: 

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**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
(AUTONOMOUS)  
**B.Tech III Year I Semester Supplementary Examinations August-2021**  
**FORMAL LANGUAGES AND AUTOMATA THEORY**  
(Common to CSE & CSIT)

Time: 3 hours

Max. Marks: 60

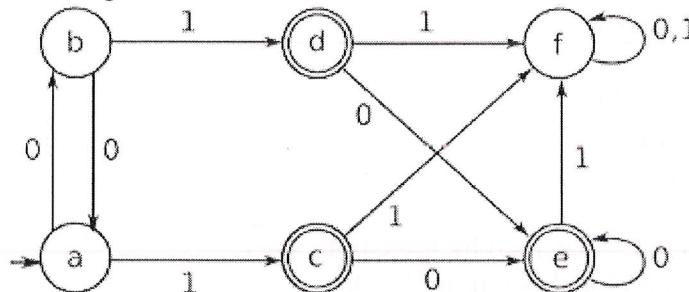
(Answer all Five Units 5 x 12 = 60 Marks)

**UNIT-I**

- 1 a i) Define relations on sets and explain its property with an example 3M  
ii) Construct Mealy machine for the given Moore machine? 3M

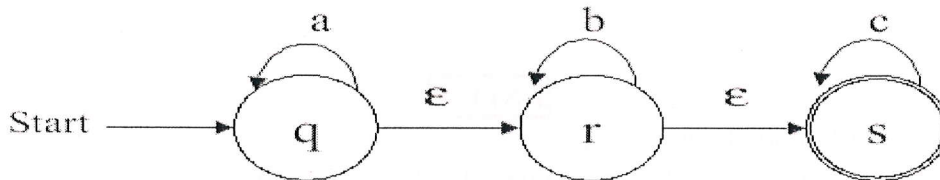
States (Q)	Next States		Output
	I/P=0	I/P=1	
→q1	q1	q2	0
q2	q1	q3	0
q3	q1	q3	1

- b Minimize the following finite automata. 6M



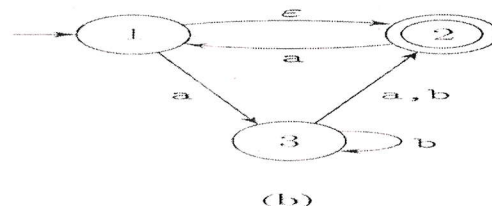
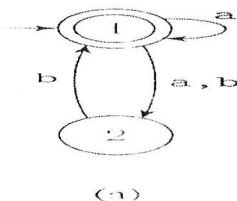
**OR**

- 2 a i) Define NFA. What are the differences between DFA & NFA? 4M  
ii) Show that  $(0^*1^*)^* = (0+1)^*$ . 2M  
b Convert the following NFA with  $\epsilon$  moves to DFA without  $\epsilon$  moves. 6M



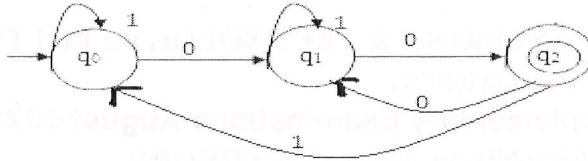
**UNIT-II**

- 3 a Prove that the language  $L = \{a^n b^n c^n \mid n \geq 1\}$  is not regular using pumping lemma. 8M  
b Construct an equivalent FA for the given regular expression  $(0+1)^*(00+11)(0+1)^*$  4M  
**OR**  
4 a Write the process of equivalence two FA's. Find whether the equivalence two FA's or not. 7M



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- b State Arden's theorem and construct the regular expression for the following FA using Arden's theorem.



**UNIT-III**

- 5 a Remove  $\epsilon$  productions from the grammar **6M**  
 $S \rightarrow ABaC, A \rightarrow BC, B \rightarrow b/\epsilon, C \rightarrow D/\epsilon, D \rightarrow d$   
 b Perform left factor from the grammar  $A \rightarrow abB/aB/cdg/cdeB/cdfB$  **6M**

**OR**

- 6 a Find the parse tree for generating the string 11001010 from the given grammar. **5M**  
 $S \rightarrow 1B/0A$   
 $A \rightarrow 1/1S/0AA$   
 $B \rightarrow 0/0S/1BB$   
 b Remove Left recursion from the grammar **7M**  
 $S \rightarrow Sab/T$   
 $T \rightarrow Tcd/F$   
 $F \rightarrow Fa/G$

**UNIT-IV**

- 7 a Convert the following PDA into an equivalent CFG. **6M**  
 $\delta(q_0, a_0, z_0) \rightarrow (q_1, z_1 z_0)$   
 $\delta(q_0, b, z_0) \rightarrow (q_1, z_2 z_0)$   
 $\delta(q_1, a, z_1) \rightarrow (q_1, z_1 z_1)$   
 $\delta(q_1, b, z_1) \rightarrow (q_1, \lambda)$   
 $\delta(q_1, b, z_2) \rightarrow (q_1, z_2 z_2)$   
 $\delta(q_1, a, z_2) \rightarrow (q_1, \lambda)$   
 $\delta(q_1, \lambda, z_2) \rightarrow (q_1, \lambda)$  // accepted by the empty stack.  
 b Explain about the graphical notation of PDA. **6M**

**OR**

- 8 a Define Instantaneous description (ID) in PDA. **6M**  
 b Construct an equivalent PDA for the following CFG **6M**  
 $S \rightarrow aAB \mid bBA$   
 $A \rightarrow bS \mid a$   
 $B \rightarrow aS \mid b$

**UNIT-V**

- 9 a Describe linear bounded automaton. **4M**  
 b Construct a Turing machine that recognizes the language  $a^n b^n c^n$ . **8M**

**OR**

- 10 a Explain conversion of regular Expression to TM with example. **10M**  
 b Define PCP. **2M**

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