

**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR**  
(AUTONOMOUS)  
**B.Tech II Year II Semester Regular & Supplementary Examinations August-2023**  
**FORMAL LANGUAGES AND AUTOMATA THEORY**  
(Common to CSE & CSIT)

Time: 3 Hours

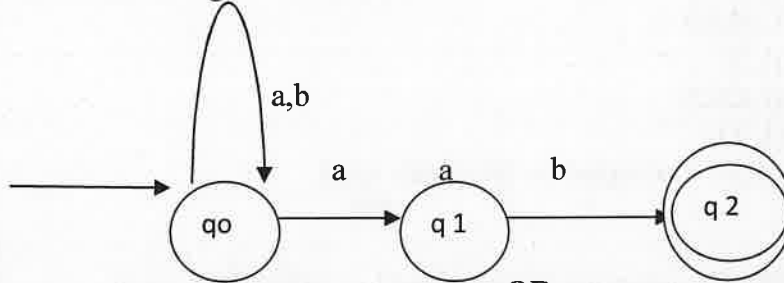
Max. Marks: 60

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

**UNIT-I**

- 1 a Differences between DFA and NFA with examples.  
b Convert the following NFA to DFA.

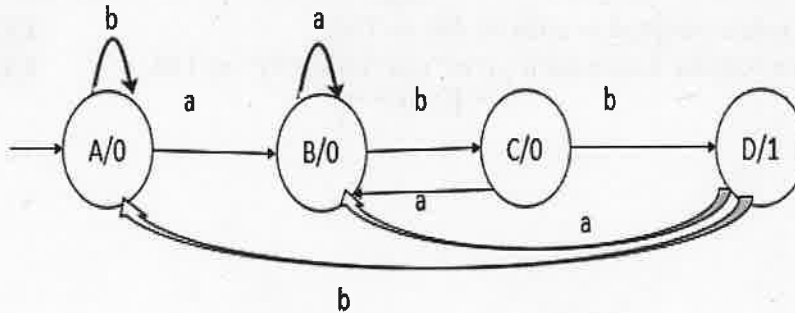
CO1 L4 6M  
CO2 L6 6M



OR

- 2 a Write why minimization of finite automata is required and explain the procedure adapted for minimization of finite automata in Table filling method.  
b Convert the given Moore Machine counts into equivalent into Mealy machine.

CO1 L6 6M  
CO2 L3 6M

**UNIT-II**

- 3 a Write applications of Pumping Lemma.  
b Prove that the language  $L = \{a^n b^n \mid n \geq 1\}$  is not regular using pumping lemma.

CO3 L1 6M  
CO3 L3 6M

OR

- 4 a Design a FA from given regular expression  $10 + (0 + 11)0^* 1$   
b Convert given regular grammar into Finite Automata  
 $S \rightarrow 01A$   
 $A \rightarrow 10B$   
 $B \rightarrow 0A \mid 11$

CO2 L6 6M  
CO3 L3 6M

**UNIT-III**

- 5 a State what is meant by derivation and parse tree with examples.  
b Remove Left recursion from the grammar  
 $S \rightarrow Sab \mid T$   
 $T \rightarrow Tcd \mid F$   
 $F \rightarrow Fa \mid G$

CO4 L1 4M  
CO4 L3 8M

OR

- 6 a Write the process adapted to convert the grammar into CNF. **CO4 L2 4M**  
 b A grammar G which is context-free has the productions **CO4 L3 8M**  
 $S \rightarrow Aab$   
 $A \rightarrow Bba$   
 $B \rightarrow bB$   
 $B \rightarrow c$

Compute the string  $w = 'acbab'$  with left most derivation.

**UNIT-IV**

- 7 Write the process adapted and convert the given PDA into an equivalent CFG. **CO5 L3 12M**  
 $\delta(q_0, a_0, z_0) \rightarrow (q_1, z_1 z_0)$   
 $\delta(q_0, b, z_0) \rightarrow (q_1, z_2 z_0)$   
 $\delta(q_1, a, z_1) \rightarrow (q_1, z_1 z_1)$   
 $\delta(q_1, b, z_1) \rightarrow (q_1, \lambda)$   
 $\delta(q_1, b, z_2) \rightarrow (q_1, z_2 z_2)$   
 $\delta(q_1, a, z_2) \rightarrow (q_1, \lambda)$   
 $\delta(q_1, \lambda, z_2) \rightarrow (q_1, \lambda)$  // accepted by the empty stack

**OR**

- 8 a Define NPDA. **CO5 L1 2M**  
 b Construct a NPDA for accepting the language  $L = \{a^i b^j c^k d^l \mid i=k \text{ or } j=1, i \geq 1, j \geq 1\}$  **CO5 L3 10M**

**UNIT-V**

- 9 a Define State Machine. **CO5 L1 2M**  
 b Construct a Turing machine that recognizes the language  $L = \{a^n b^n \mid n > 1\}$ . Show an ID for the string 'aaabbb' with tape symbols. **CO6 L6 10M**

**OR**

- 10 a Explain the procedure adapted to convert RE to TM. **CO6 L2 4M**  
 b Convert the given regular Expression  $(a+b)^*(aa+bb)(a+b)^*$  to TM. **CO6 L3 8M**

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