Code No: **20CS5T03** **R20**

**III B. TECH I SEMESTER REGULAR EXAMINATIONS, DECEMBER - 2022**

# FORMAL LANGUAGES AND AUTOMATA THEORY

**(Computer Science and Engineering)**

**Time: 3 Hours** **Max. Marks: 70**

**Note:** Answer **ONE** question from each unit **(5 × 14 = 70 Marks)**

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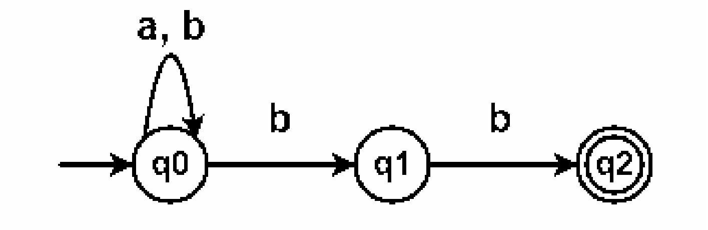
UNIT-I

1. a) Construct a DFA to accept the following language: [8M]
L = {w|w is of even length and begins with 01}
also draw the Transition Table, Transition Diagram and check whether the string 0111101 is accepted by the Finite automata.

b) Differentiate between Moore and Mealy Machine [6M]

(OR)

2. a) Convert to DFA the following NFA and write procedure involved in conversion: [8M]




b) Explain the procedure for transforming a mealy machine into a moore machine? [6M]

UNIT-II

3. a) List and explain the operators of Regular expressions [6M]

b) Construct Finite Automaton for the following Regular Expression: $01^* + 1$ [8M]

(OR)

4. a) Write short note on different types of Grammars [6M]

b) Let G = $\{A_0, A_1, A_2, A_3\}$, {a, b}, P, $A_0$} where P consists of [6M]
$A_0 \rightarrow aA_0 \mid bA_1,$
$A_1 \rightarrow aA_2 \mid aA_3,$
$A_2 \rightarrow a \mid bA_1 \mid bA_3,$
$A_3 \rightarrow b \mid bA_0$
Construct NFA accepting L(G)

c) Construct Left linear grammar for the given Right linear Grammar [2M]
$A \rightarrow 0 \mid 0B$
$B \rightarrow 1C$
$C \rightarrow 0 \mid 0B$
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UNIT-III

5. a) Let G = {{S, A}, {a, b}, P, S} where [6M]
P: S → aAS | a,
A → SbA | SS | ba
Construct a string w = aabbaa, using Leftmost and Rightmost Derivation.

b) Consider the Grammar G [8M]
S → ABC
A → BC | a
B → bAC | ε
C → CAB | ε
Write procedure for Eliminating ε-Productions and Construct G1 which contains no ε-productions. (Note: Symbol ε means epsilon)

(OR)

6. a) Write the steps involved in Pumping Lemma for CFL [7M]

b) Check whether the given language is CFL or not: [7M]
$L = \{a^i b^i c^i \mid i>=1\}$

UNIT-IV

7. a) Define PDA. Construct PDA for $L = \{WcW^R \mid W \text{ is in } (0+1)^* \}$ [7M]

b) Construct DPDA for the language $L = \{0^n 1^n 2^n \mid n>=1\}$ [7M]
[note: equal number of 0's followed by equal number of 1's followed by equal number of 2's]

(OR)

8. a) Write the rules to construct PDA. [6M]

b) Write Procedure to generate PDA from Grammar. Convert the following grammar into PDA [8M]
I → a | b | Ia | Ib | I0 | I1
E → I | E * E | E + E | (E)

UNIT-V

9. a) Write notation for Turing Machine. [6M]

b) Design Turing Machine for 2's complement. [8M]

(OR)

10. a) Draw and explain the relationship between Recursive, RE languages and also write differences between them. [7M]

b) Define Post's correspondence problem with suitable example explain it. [7M]

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