

Seat No. **OCT-NOV 2025 WINTER EXAMINATION****1154 B.Tech. CBCS****Sub. Name: Automata Theory****Sub. Code: 63531/79139/79427****Day and Date: Saturday ,06-12-2025****Total Marks: 70****Time: 10:30 AM To 01:00 PM**

- Instructions:**
1. All questions are compulsory
 2. Assume suitable data wherever necessary and mention it boldly
 3. Draw neat labelled diagrams wherever necessary

Q1) Solve MCQs. (02 Marks Each)**[14]**

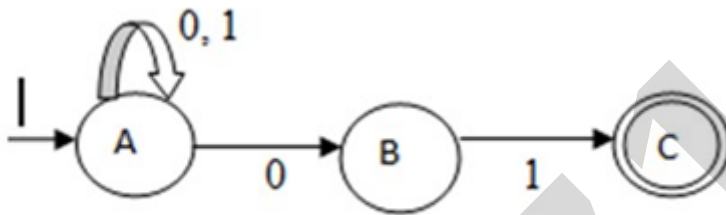
- a. Which of the following is correct RE of language having string start with 00
 - a) $00(0+1)^*$
 - b) $(0+1)^*00$
 - c) $(0+1)^*00(0+1)^*$
 - d) None of the mentioned
- b. Which of the following statement is false?
 - a) Union of two CFLs is also CFL
 - b) Concatenation of two CFLs is also CFL
 - c) Union of two Regular Languages is also Regular language
 - d) Intersection of two CFLs is also CFL
- c. $\delta^*(q, ya)$ is equivalent to
 - a) $\delta((q, y), a)$
 - b) $\delta(\delta^*(q, y), a)$
 - c) $\delta(q, ya)$
 - d) independent from δ notation
- d. For NFA, which among the following is correct?
 - a) $\delta: Q \times (\Sigma \cup \{\epsilon\}) \rightarrow 2Q$
 - b) $\delta: Q \times (\Sigma^*) \rightarrow 2Q$
 - c) $\delta: Q \times \Sigma \rightarrow 2Q$
 - d) All of the mentioned
- e. Transition move of PDA is decided by
 - a) Current State
 - b) Input Symbol
 - c) Stack
 - d) All of these
- f. A Turing machine operates over:
 - a) Finite memory tape
 - b) Infinite memory tape
 - c) Depends on the algorithm
 - d) None of the mentioned
- g. The minimum number of productions required to produce language consisting of

odd length palindrome strings over $\Sigma = \{a, b\}$ is

- a) 3
- b) 4
- c) 5
- d) 6

Q2) Solve any Two of the following (07 Marks Each) [14]

- a. Define finite automata and design DFA for $\Sigma = \{0,1\}$ for a language that ends with 11.
- b. State and Prove Kleene's theorem Part-I.
- c. Convert the following NFA to DFA.



Q3) Solve any Two of the following (07 Marks Each) [14]

- a. Explain context free grammar and obtain grammar for algebraic expressions.
- b. For the Grammar
 - $E \rightarrow E+T \mid T$
 - $T \rightarrow T * F \mid F$
 - $F \rightarrow (E) \mid a \mid b$
 Give the derivation of $(a+b)^*a+b$.
- c. If G is a grammar $S \rightarrow SbS, S \rightarrow a$. Show that G is ambiguous.

Q4) Solve any Two of the following (07 Marks Each) [14]

- a. Give the formal definition of PDA and construct the PDA for balanced string of brackets.
- b. Explain the concept of bottom up parsing with example.
- c. Convert the following grammar to Top-down PDA
 - $S \rightarrow aABB \mid Aaa$
 - $A \rightarrow aBB \mid a$
 - $B \rightarrow bBB \mid \wedge$

Q5) Solve any Two of the following (07 Marks Each) [14]

- a. Construct a TM for computing function of L for the set of palindromes.
- b. Explain about Turing machine as language acceptor.
- c. State and prove the pumping lemma for context free languages.

End Of Question Paper

Important Note for Chief Exam Officer / SRPD Coordinator / Sr Supervisor/ Student -

This Question Paper may be distributed for following Subjects as common code.

सदरची प्रश्नपत्रिका खालील विषयांकरिता वितरित करता येईल.

- 1] (101) Bachelor of Engineering (79427) Automata Theory Part 2 SEM 4
- 2] (101) Bachelor of Engineering (63531) Automata Theory Part 2 SEM 4
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