

Roll No.

Total No. of Pages : 02

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B.Tech. (CSE) (Sem.-5)

FORMAL LANGUAGE AND AUTOMATION THEORY

Subject Code : BTCS-502-28

M.Code : 78321

Date of Examination : 19-06-2025

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY** consisting of **TEN** questions carrying **TWO** marks each.
2. **SECTION-B** contains **FIVE** questions carrying **FIVE** marks each and students have to attempt any **FOUR** questions.
3. **SECTION-C** contains **THREE** questions carrying **TEN** marks each and students have to attempt any **TWO** questions.

SECTION-A

1. **Write briefly :**
 - a) Define Grammar.
 - b) How the regular expression "(a|b)*" is interpreted?
 - c) Write differences between NFA and DFA?
 - d) What is a derivation tree and its yield?
 - e) What is the ambiguity in a grammar?
 - f) Can you provide an example of a context-sensitive production rule?
 - g) What is meant by halting problem?
 - h) What is the Church-Turing thesis?
 - i) Difference between NP hard and NP complete.
 - j) Universal Turing Machine.

SECTION-B

2. Discuss the transformation process from a Nondeterministic Finite Automaton (NFA) to a Deterministic Finite Automaton (DFA) with the help of example.
3. Explore the relationship between regular expressions and finite automata. How can regular expressions be converted into equivalent DFA and vice versa?
4. What is Pumping Lemma? How pumping lemma is used to prove that a given grammar is not a regular grammar?
5. What is Pushdown Automation? How PDA is different from FA?
6. Describe the concept of reducibility in the context of undecidable problems. How is it used to prove the undecidability of other problems?

SECTION-C

7. Define Formal language. Explain Chomsky hierarchy of languages with example of each type of language.
8. Explain the concept of Turing Machine. Construct a TM for $L = \{0^n, 1^n 2^n \mid n \geq 1\}$.
9. **Write a short note on:**
 - a) LBA
 - b) Hamilton Cycle

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.