

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

**B.Tech. (Computer Science & Engineering)(Sem.-5)
FORMAL LANGUAGE & AUTOMATA THEORY**

Subject Code : BTCS-502-18

M.Code : 78321

Date of Examination: 23-11-2023

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) What is a formal language and how is it different from a natural language?
- b) Define the term "alphabet" in the context of formal languages.
- c) How do we represent Grammar?
- d) Define NDFA.
- e) The regular expression ab^*c will give _____?
- f) What is context sensitive grammar?
- g) Define LBA.
- h) What is NP Complete problem?
- i) Define Intractability.
- j) Define NFA.

SECTION-B

2. Describe the acceptance criteria for both NFAs and DFAs. How does each type of automaton determine whether a given input string is accepted or rejected?
3. What is PDA? How does a PDA handle the recognition of context-free languages and what role does its stack play in this process?
4. Explain the concept of a Linear Bounded Automaton (LBA) and how it relates to the recognition of context-sensitive languages?
5. Describe the operation of a Turing Machine in terms of reading and writing symbols on the tape, state transitions and halting conditions.
6. Explain the concept of Hamiltonian Cycle in Graphs.

SECTION-C

7. Discuss the different applications of Formal Language and Automata Theory.
8. Explain the three key components of the Pumping Lemma: the pumping length, the string decomposition and the pumping condition. How does the Pumping Lemma help in proving that a language is not regular?
9. Write a short note on :
 - a) Difference between Decidability and undecidability.
 - b) Cook Levin Theorem for satisfiability.

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.