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.