



R18 Regulation

Subject code: 2P4FE

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech IV Semester Supplementary Examinations, September 2023

Formal Language & Automata Theory

(IT)

Maximum Marks: 70

Date:23.09.2023 Duration: 3 hours

- Note:
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
 3. Part B consists of 5 Units. Answer any one full question from each unit.
 4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks

(10x2M=20 Marks)

- 1 Define ϵ -NFA with Example.
- 2 Define non-deterministic finite automata with example.
- 3 Define Regular Expression
- 4 List any two algebraic properties of Regular Expressions
- 5 Define Grammar?
- 6 Compare DPDA and NPDA.
- 7 What do you mean by Instantaneous Description of Turing Machine?
- 8 Define Turing Machine.
- 9 Distinguish Recursive languages and Recursively enumerable languages.
- 10 Define Decidability.

Part-B

Answer All the following questions.

(5X10M=50Marks)

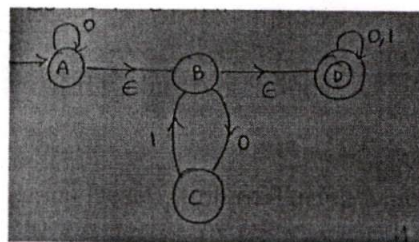
- 11 Construct a minimal DFA, which accepts the language over $\{a,b,c\}$ where $L = \{a^n b^m c^l \mid n,m,l \geq 0\}$

(10M)

OR

- 12 Design NFA from the given ϵ -NFA

(10M)



- 13 Construct the Regular expression for the given FA.

(10M)

Q/ Σ	a	b
Q ₁	Q ₂	Q ₂
Q ₂	Q ₃	Q ₄
Q ₃	Q ₂	Q ₂
Q ₄	Q ₂	Q ₂

Q₁ is the initial state

Q₃ is the final state

- OR
- 14 a) Design a FA from the given RE is $10+(0+11)0^*1$ [5M]
b) List out the closure properties of regular expression. [5M]
- 15 a) Explain the process of simplification of the grammar. [5M]
b) Explain left most and right most derivations with examples. [5M]
- OR
- 16 Construct a PDA that recognizes strings(over alphabet 'a' and 'b')that contains equal number of a's and b's. write instantaneous description for the string "aabbabab" [10M]
- 17 Prove pumping lemma for Context Free Language. and Prove $L = \{ a^i b^i c^i \mid i \geq 1 \}$ is not context free language [10M]
- OR
- 18 Design a Turing machine for unary multiplication. [10M]
- 19 a) Discuss in brief about NP-Hard problems. [5M]
b) Explain about the Decidability and Undecidability problems. [5M]
- OR
- 20 Define the following and give examples
a) P-type [5M]
b) NP-Hard [5M]