



R20 Regulation

Subject code: 3P4EE

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Regular Examinations, July 2022

FORMAL LANGUAGES & AUTOMATA THEORY

(Common to CSE & CSE(AI&ML))

Maximum Marks: 70

Date: 30.08.2022 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 which carries 10M.
 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 Draw Non-deterministic finite automata to accept strings containing the substring 0101.
- 2 Define the term Epsilon transition.
- 3 Write Regular Expression for the set of strings over $\{0,1\}$ that have at least one '0'.
- 4 State the pumping lemma for regular languages.
- 5 Construct a CFG over $\{a,b\}$ generating a language consisting of an equal number of a's and b's.
- 6 What are the different types of the language accepted by a PDA and define them?
- 7 What are the applications of the Turing Machine?
- 8 Define normal form.
- 9 When can we say a problem is decidable? Give an example of an undecidable problem.
- 10 Mention the difference between P and NP problems.

Part-B

Answer All the following questions.

(10MX 5=50Marks)

- 11 Construct NFA for MOD 5 for a binary number and convert the same to DFA. [10]
OR
- 12 a. Distinguish NFA and DFA with examples.
b. Define FA, NFA and DFA. [5+5]
- 13 Construct Mealy and Moore machine for 2'S compliment and trace for a string. [10]
OR
- 14 Construct a minimized DFA from the regular expression: $(a+b)(a+b)^*$ and trace for a string baaaab. [10]
- 15 Construct a CFG for the regular expression $(011+1)(01)$ [10]
OR
- 16 Is the following grammar ambiguous? Justify your answer. [5+5]
 1. $E \rightarrow E+E | E^*E | id$
 2. $E \rightarrow E+E | E^*E | (E) | a$

17 Write briefly about the programming techniques for Turing Machines. [10]

OR

18 State and prove the pumping lemma for CFL. What are its main applications? Give two examples. [10]

19 What are tractable problems? Compare it with intractable problems. [10]

OR

20 State and prove the Post's correspondence problem. [10]