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→ E+E |E*E | id
2. E→ 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]