R17 Regulation *Subject code:* 1P4ED

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech II Year II Semester Supplementary Examinations, July 2021

FORMAL LANGUAGES & AUTOMATA THEORY

(CSE)

Maximum Marks: 70 Date:22.07.2021 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 Define Non-deterministic Finite Automata.
2 What is the mathematical model of finite automata?
3 What are the Applications of the Pumping Lemma?
4 What are the Decision Properties of Regular Languages?
5 Define context free grammar.
6 Prove the equivalence of acceptance of PDA by empty state and final state.
7 List and prove any two closure properties of CFL's
8 Construct Turing Machine for 1's complement for binary numbers?
9 Give any two examples of Undecidable Problem?
10 What are Class P problems?

Part-B

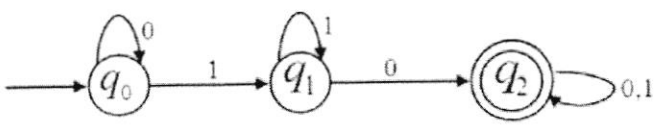
Answer All the following questions. (5X10M=50Marks)

11 Construct NFA with ε which accepts a language consisting the strings of any number of 0's followed by any number of 1's followed by any number of 2's and also convert into NFA without ε transitions. [10]

OR

12 Construct the Moore machine to determine residue mod 3 and convert into Mealy machine. [10]

13 Construct the regular expression corresponding to the language accepted by following DFA. [10]



OR

14 Convert regular expression (01* +1) to finite automata. [10]

15 a) Explain about Ambiguity in Grammars and Languages with example. [5]
b) Discuss in detail about leftmost and right most derivation tree with example. [5]

OR

16 Design a Push Down Automaton for the language $L=\{a^n b^{2n} |n>=1\}$ [10]

17 a) Explain an algorithm to convert a CFG to Chomsky Normal Form? [5]

b) Explain Closure Properties of Context-Free Languages. [5]

OR

18 Construct a Turing machine to recognize the language $L=\{a^n b^n |n>=1\}$ [10]

19 a) Define post`s correspondence problem and show that it is undecidable. [5]
b) Write the properties of recursive and non-recursive enumerable languages. [5]

OR

20 What do you mean by NP-Problems? Justify why the Travelling Salesman problem is a NP-Problem. [10]