R17 Regulation *Subject code:* 1P4FD

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

(Information Technology)

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 DFA.
2 Write about the applications of Finite Automata?
3 If a Regular grammar G is given by S→aS/a Find DFA (M) accepting L(G)?
4 Define Pumping Lemma for Regular Languages?
5 What is an ambiguity?
6 Explain the concept of push down automata?
7 Define Pumping lemma for the CFG.
8 Define Turing Machine
9 Write about decidable problems concerning regular expressions
10 Give the Post's Correspondence problem statement.

Part-B

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

11 Construct DFA to accept the language of all strings of even numbers of a's & numbers of b's divisible by three over alphabet $\sum$= {a,b} or (a+b)*. [10]

OR

12 Give Mealy and Moore machines for the input from (0 + 1)*, if the input ends in 101, output A; if the input ends in 110, output B; otherwise output C. [10]

13 a) Define Regular Expression? Explain about the properties of Regular Expressions. [5]
b) Construct a DFA for the Regular expression (0+1)* (00+11) (0+1)* [5]

OR

14 Explain the pumping lemma for regular expression and prove that the given language $L=\{0^n1^n|n>=1\}$ is not a regular. [10]

15 Explain the process of simplification of the grammar with necessary examples. [10]

OR

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

17 a) Explain Closure properties of Context Free Languages. [5]
b) Design a Turing machine to recognize all strings consisting of odd numbers of 1's. [5]

OR

18 a) Construct a Turing Machine that will accept the Language consists of all palindromes of 0's and 1's? [5]
b) Explain about types of Turing Machine. [5]

19 a) Give an overview of recursively enumerable language. [5]
b) Give the correspondence between P, NP and NP-complete problems. [5]

OR

20 a) Explain about the Decidability and Undecidability Problems. [5]
b) Discuss in brief about NP Hard problems. [5]