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 2022

FORMAL LANGUAGES & AUTOMATA THEORY

CSE

Maximum Marks: 70 Date: 28-07-2022 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.
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 Give differences between DFA and NFA.
3 Give any two algebraic properties of Regular Expressions
4 Write the steps for the conversion of Regular Expression to DFA
5 Define Context Free Grammar.
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 Brief write about Post's Correspondence problem

Part-B

Answer All the following questions. (10M X 5=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 Prove the following : [5+5]
i) ε+1*(011)*(1* (011)*)* = (1+011)*
ii) (1=00*1)+(1+00*1)(0+10*1)*(0+10*1) = 0*1(0+10*1)*

13 Explain and prove the pumping lemma for context free languages. Show that the languages $L=\{a^n b^n c^j | n \leq j \leq 2n\}$ is not CFL. [10]

OR

14 Show that $L= \{a^{n!} | n>=1\}$ is not regular. [10]

15 a) Write the process of simplifying the grammar with example.
b) Explain left most and right most derivations with examples. [5+5]

OR

16 Construct a PDA which accepts [10]
i) $L= \{a^3 b^n c^n | n \geq 0\}$ ii) $L=\{ a^p b^q c^m \mid p+m=q\}$ iii) $L= \{a^i b^j c^k \mid i+j=k; i \geq 0, j \geq 0\}$

17 List and explain in details about the closure properties if Context Free Languages. [10]

OR

18 Give an algorithm to convert a CFG to Chomsky Normal Form? Explain in detail with an example. [10]

19 Explain the following: [10]
i) Decidability ii) Post Correspondence Problem iii) Turing Reducibility

OR

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