R20 Regulation *Subject code:* **3P4FF**

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Regular Examinations, July 2022

FORMAL LANGUAGES AND AUTOMATA THEORY
(INFORMATION TECHNOLOGY)

Maximum Marks: 70 Date:02.08.2022 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 Construct deterministic finite automata to recognize odd number of 1's and even number of 0's?
2 State the difference between NFA and DFA
3 Name any four closure properties of regular languages
4 Give few Applications of the Pumping Lemma
5 When is Push Down Automata (PDA) said to be deterministic?
6 Construct the Context free grammar representing the set of palindromes over (0+1)*
7 What is Chomsky's normal form?
8 Construct a Turing machine to compute 'n mod 2' where n is represented in the tape in unary form consisting of only 0's.
9 What is recursively enumerable language?
10 How to prove that the Post Correspondence problem is Undecidable?

Part-B

Answer All the following questions. (10MX 5=50Marks)

11 Explain Mealy and Moore machines in detail. (10)

OR

12 Construct a DFA that accepts the following: (10)
$L=\{x \in \{a,b\}:|x|a = \text{odd and } |x|b = \text{even}\}$.

13 Construct a minimized DFA from the regular expression: (10)
10+(0+11)0*1

OR

14 Which of the following languages is regular? Justify.(Using Pumping Lemma) (10)
(i) $L=\{a^m b^n \mid m>n\}$ (ii) $L=\{a^n b^m \mid n,m>=1\}$

15 What is the purpose of normalization? Construct the CNF and GNF for the following grammar and explain the steps. (10)

S→aAa | bBb |€
A→C|a
B→C|b
C→CDE | €
D→A|B|ab

OR

16 Is the following grammar is ambiguous? Justify your answer.

1. E→ E+E |E*E | id (6)
2. E→ E+E|E*E|(E)|a (4)

17 Find Greibach normal form for the following grammar

(i) S→AA | 1, A→SS |0 (6)
(ii) S→a|AB, A→a|BC, B→b, C→b (4)

OR

18 Discuss the various techniques for Turing Machine Construction. (10)

19 What are tractable problems? Compare it with intractable problems. (10)

OR

20 Write a note on NP problems. (10)