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, September 2023

FORMAL LANGUAGES & AUTOMATA THEORY

(CSE)

Maximum Marks: 70 Date:24.09.2023 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

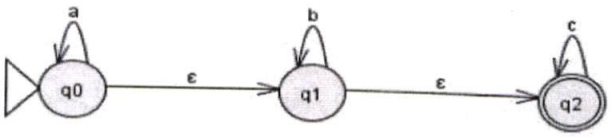
All the following questions carry equal marks **(10x2M=20 Marks)**

1 Define
a) Alphabet b)strings
2 Give differences between Mealy Machine and Moore Machine
3 List the applications of Regular Expressions.
4 Give the closure properties of regular languages.
5 What is an ambiguity?
6 Differentiate Deterministic PDA and Non- Deterministic PDA.
7 Define Chomsky Normal Form.
8 Explain about Restricted Turing Machine.
9 Define Universal languages. Give examples
10 Explain Class NP Problems

Part-B

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

11 Convert the following NFA with ε- transitions to without ε- transitions. [10]



OR

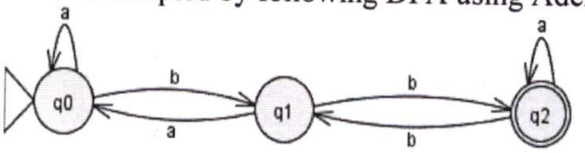
12 Construct the Mealy machine for the following Moore machine. [10]

Present	Next State		output
	i/p=0	p=1	
q0	q1	q2	1
q1	q3	q2	0
q2	q2	q1	1
q3	q0	q3	1

13 Write the procedure for minimizing a DFA and explain it with a suitable example. [10]

OR

14 Find the regular expression accepted by following DFA using Adern's theorem. [10]



Consider the grammar E->E + E | E * E | id. Write the right-most derivation and left most derivation for the sentence id*id+id. Discuss whether the given grammer is ambiguous or not. Justify your assertion. [10]

15

OR

a) Differentiate Deterministic PDA and Non- Deterministic PDA. [5]

b) Construct a Two Stack PDA which accepts $L=\{a^n b^n c^n | n \varepsilon N\}$ [5]

17 a) Convert the following grammar to CNF. [5]

$S \rightarrow bA \mid aB$

$A \rightarrow bAA \mid aS \mid a$

$B \rightarrow aBB \mid bS \mid b$

b) What is Unit production? What is the procedure to remove the unit productions in CFG? [5]

OR

18 a) Explain in detail various types of Turing Machines. [5]

b) List the properties of Recursive and Recursively Enumerable Languages. [5]

19 What is diagonalization ? Use diagonalization to show that the halting problem is unsolved. [10]

OR

20 What are P and NP class of Languages? What is NP Complete and give examples? [10]