R20 Regulation *Subject code:3P4FF*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Regular/Supplementary Examinations, September 2023

FORMAL LANGUAGES AND AUTOMATA THEORY
(INFORMATION TECHNOLOGY)

Maximum Marks: 70 Date:23.09.2023 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 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 NFA with epsilon moves with example.
2 Write transition diagram for DFA accepting string ending with 00.
3 Define Regular Languages.
4 Write the applications of pumping lemma for regular languages.
5 Define Context-free –grammar.
6 What do you mean by instantaneous description for push down automata?
7 Define Greibach normal form.
8 Define Turing Machine.
9 Define Recursively enumerable languages.
10 What is NP-complete problem?

Part-B

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

11 a) Design the transition diagram of a FA which accepts all strings of 1's and 0's in which Both the number of 0's and 1's are even. (6M)
b) Write any four differences between DFA and NFA . (4M)

OR

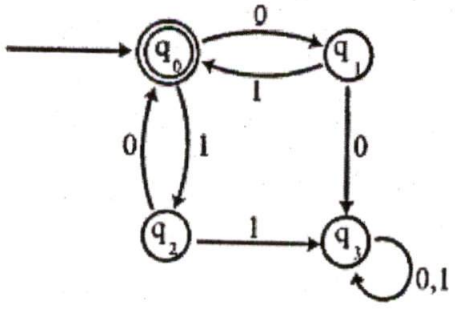
12 a) Draw a DFA which accepts strings ending with 11 where the input is {0,1} (5M)
b) Convert Moore machine to Mealy machine with an example. (5M)

13 a) Construct a transition Diagram for corresponding to the regular expression (ab + a)* (aa+b). (5M)
b) Examine that L= {/ i >1} is not regular (5M)

OR

14 a) Convert Regular Expression 01* + 1 to Finite Automata. (5M)
b) Summarize the closure properties of regular language. (5M)

15 a)Construct left and right linear grammar for the given NFA (6M)



b) Discuss the simplification of context free grammar. What is the importance of useless symbols and unit productions in it? (4M)

OR

16 a) Explain the elements of PDA. Construct PDA for L = $\{0^n1^m2^k\}$ Where n,m,k>=1 (5M)

b) Outline the PDA with example. In what ways a PDA can show the acceptance of astring. Explain with example. (5M)

17 a) Construct a TM for computing ones complement calculation. (5M)

b) Discuss about universal turing Machine. (5M)

OR

18 a) Illustrate the construction of Context Normal Form with an example. (5M)

b) Find the GNF equivalent to the following (5M)

$S \rightarrow AA \mid a$

$A \rightarrow SS \mid b$

19 a) Write a shot note on post's correspondence problem? (3M)

b) Check the following is PCP or not.Let $\Sigma = \{0, 1\}$. Let A and B be the lists of three strings each, defined as: (7M)

	List A	List B
i	w i	x i
1	1	111
2	10111	10
3	10	0

OR

20 a) Explain about Recursive languages, Recursively enumerable languages and its properties. (5M)

b) Write short note on NP- hard and NP-complete problem. (5M)