R20 Regulation *Subject code: 3P4FF*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Supplementary Examinations, February 2024

FORMAL LANGUAGES AND AUTOMATA THEORY

(INFORMATION TECHNOLOGY)

Maximum Marks: 70 Date: 26.02.2024 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. Explain Moore Machine & Melay Machine.
2. Give the applications designed as finite state system.
3. Write regular expression for denoting language containing empty string.
4. Define any three closure properties of regular languages.
5. Differentiate DPDA and NPDA
6. What are the applications of Context free languages?
7. Define CNF.
8. Describe Multitape Turing machine.
9. Write a short note on Recursive languages.
10. What is tractable problem & Intractable problem

Part-B

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

11. a) Construct Mealy machine for (0 + 1)*(00 + 11) and convert to Moore machine. (6M)
    b) Explain the difference between Mealy machine and Moore machine (4M)

OR

12. a) Construct NFA with moves which accepts a language consisting the strings of any number of a's followed by any number of b's followed by any number of c's. (5M)
    b) Construct NFA for (0 + 1)*(00 + 11)(0 + 1)* and Convert to DFA. (5M)

13. a) Evaluate regular expressions representing the following sets (6M)
    i)The set of all stings over {0, 1} having at most one pair of 0's or at most of one pair of 1's
    ii)The set of all strings over {a, b} in which the number of occurrences of a is divisible by 3
    b) Explain the regular expression. (4M)

OR

14. a) Design a FA for the following Languages (6M)
    i) (0*1*)*
    ii) (0+1)*111*
    iii) (0*11*+101).
    b) Explain Pumping Lemma for Regular Languages with example (4M)

15. a) Define PDA(Push Down Automata) and Construct a PDA for the following grammar
S->aSa
S->bSb
S->c (7M)

b) Describe Equivalence of PDA's and CFG's. (3M)

OR

16. a) Check whether the grammar is ambiguous or unambiguous or not over alphabets {a, b}.
S →aSa\bSb\a\b\ Є . (5M)

b) Derive the left most and the rightmost derivations for the string aabbaa. (5M)
G=({S,A},{a,b},S,P), where P is,
S ---> aAS\a
A --->SbA\SS\ba

17. a) Design TM which accepts strings ending with 111 where the input is taken from {0,1} (5M)

b) Explain various types of Turing Machine? (5M)

OR

18. a) Convert the following grammar into CNF (5M)
S -->aSa /bSb/a/b

b) Explain Closure Properties of CFL'S (5M)

19. a) Write briefly about Decidability of problems (5M)

b) Write briefly about UnDecidability of problems (5M)

OR

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

b) Define post's correspondence problem and show that it is undecidable with example (5M)