

R20 Regulation

Subject code: 3P4PF

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

H.Tech IV Semester Supplementary Examinations, April 2023

FORMAL LANGUAGES & AUTOMATA THEORY

(IT)

Maximum Marks: 70

Date: 12.05.2025

Duration: 3 hours

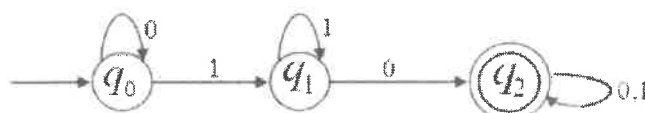
- Notes:
1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 20 marks. Answer all questions to Part A.
 3. Part B consists of 4 Marks. Answer any one full question from each unit.
 4. Each question carries 10 marks and may be solved by any method.

Part-A

All the following questions carry equal marks (10X2M=20 Marks)		Marks	CO	BTL
1	Define the terms a symbol, string, and Language.	2M	1	L1
2	Explain the difference between DFA and NFA.	2M	1	L1
3	Define Regular Expression	2M	2	L1
4	List any two algebraic properties of Regular Expressions	2M	2	L1
5	Explain Left most derivation with an example.	2M	3	L1
6	What is an ambiguity.	2M	3	L1
7	Discuss the decidability of the CFL's	2M	4	L1
8	Define multi-tape Turing machine.	2M	4	L1
9	Discuss which Recursive languages and Recursively enumerable languages.	2M	5	L1
10	Define NP-Hard class.	2M	5	L1

Part-B

Answer All the following questions (5X10M=50 Marks)		Marks	CO	BTL
11	Construct a Moore machine that takes set of all strings over {0,1} and produces 'A' as output if input ends with '10' and produces 'B' as output if input ends with '11' otherwise produces 'C'	10M	1	L2
OR				
12	a) Define NFA. Construct NFA which accepts set of all strings over {a, b} where third symbol from R.H.S is 'a'. b) Convert that corresponding NFA to DFA.	5M 5M	1	L2
13	a) Design a FA from the given RE is $10+(0+1)10^*1$ b) List out the closure properties of regular languages.	5M 5M	2	L2
OR				
14	Show Arden's theorem. Construct the regular expression corresponding to the language accepted by following DFA.	10M	2	L2



15	Consider the grammar $E \rightarrow E + E \mid E * E \mid id$. Write the right-most derivation and left most derivation for the sentence $id*id+id$. Discuss whether the given grammar is ambiguous or not.	10M	3	L2
OR				
16	Define PDA. Construct a PDA for the given language $L = \{a^n b^{2n} / n \geq 1\}$ via Empty stack.	10M	3	L2
17	Define Chomsky's normal form? Change following grammar G into CNF where $G = (\{S, A, B, D\}, \{a, b, d\}, P, S)$ $P: S \rightarrow aAD$ $A \rightarrow aB \mid bAB$ $B \rightarrow b$ $D \rightarrow d$	10M	4	L2
OR				
18	Construct a Transition diagram for Turing Machine to accept the language $L = \{w\#w^R \mid w \in (a+b)^*\}$	10M	4	L2
19	a) Discuss in brief about NP-Hard problems. b) Explain about the Decidability and Undecidability problems.	5M 5M	5	L2
OR				
20	a) Explain about recursively enumerable language. b) Compare P, NP problems.	5M 5M	5	L2