R20 Regulation *Subject code:3P4FF*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

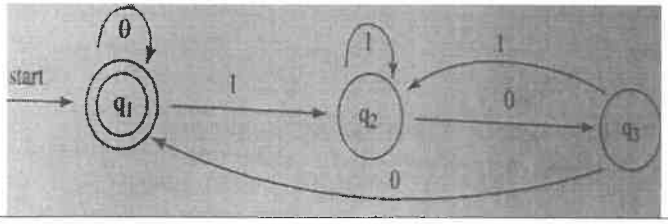
B.Tech IV Semester Supplementary Examinations, December 2024

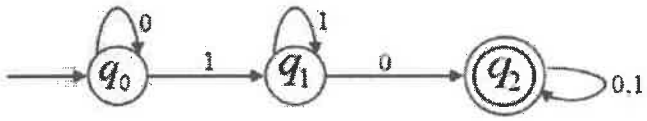
FORMAL LANGUAGES & AUTOMATA THEORY

(IT)

Maximum Marks: 70 Date:12.12.2024 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)		CO	Bloom Tx
1	Define the terms symbol, string and Language.	1	L1
2	Write the difference between DFA and NFA.	1	L1
3	Define Regular Expression.	2	L1
4	List any two algebraic properties of Regular Expressions.	2	L1
5	Write about Left most derivation with an example?	3	L1
6	What is an ambiguity?	3	L1
7	Write the decision properties of the CFL's?	4	L1
8	Define multi- tape Turing machine.	4	L1
9	Distinguish Recursive languages and Recursively enumerable languages.	5	L1
10	Define NP-Hard class.	5	L1
	Part-B		
Answer All the following questions. (5X10M=50Marks)		CO	Bloom Tx
11	Define DFA. Construct a minimal DFA over {a,b}where language $L=\{a^n b^m \mid n,m>=1\}$ [10M]	1	L2
	OR		
12	Design a mealy machine accepting the language consisting of strings from ε^* where $\varepsilon=\{a,b\}$ and the strings should end with either aa (or)bb. [10M]	1	L2
13	State and prove Arden's theorem. Find out the regular expression from the given FA [10M] 	2	L2
	OR		

14	State Arden's theorem. Construct the regular expression corresponding to the language accepted by following DFA. [10M] 	2	L2
15	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 grammar is ambiguous or not. [10M]	3	L2
	OR		
16	Construct CFG from PDA [10M] A=({q0,q1},{a,b},{Z0,Z},δ ,q0,Z0,$\emptyset$) Where δ : δ(q0,b, Z0) = (q0, ZZ0) δ(q0,b, Z) = (q0, ZZ) δ(q1,b, Z) = (q1, ϵ) δ(q0, ϵ, Z0) = (q0, ϵ) δ(q0,a, Z) = (q0, Z) δ(q1,a, Z0) = (q0, Z0)	3	L2
17	Prove pumping lemma for Context Free Language. and Prove L = { $a^i b^i c^i$ | i ≥ 1} is not context free language [10M]	4	L2
	OR		
18	Design a Turing machine for unary multiplication. [10M]	4	L2
19	A) Discuss in brief about NP-Hard problems. [10M] B) Explain about the Decidability and Undecidability problems. [10M]	5	L2
	OR		
20	A) Explain about recursively enumerable language. [10M] B) Compare P,NP problems. [10M]	5	L2