R22 Regulation *Subject code:4E6FC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VI Semester Regular/Supplementary Examinations, April 2026

AUTOMATA THEORY AND COMPILER DESIGN

(IT)

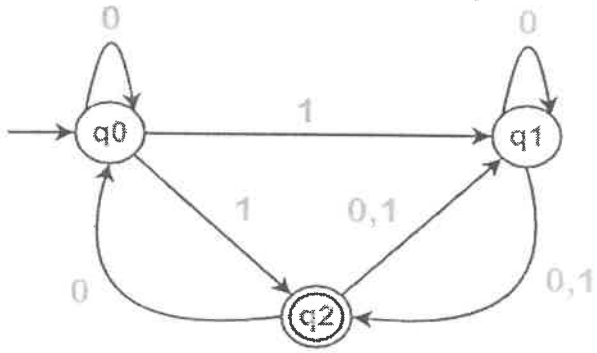
Maximum Marks: 60 Date:16.04.2026 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 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 (10X1M=10 Marks)		Marks	CO	Bloom Tx
1.a)	Define Alphabet and String with examples	1M	1	L1
b)	Define NFA formally	1M	1	L1
c)	What are algebraic laws of regular expressions?	1M	2	L1
d)	Define Context Free Grammar (CFG)	1M	2	L1
e)	What are the components of a PDA?	1M	3	L1
f)	What is an Instantaneous Description (ID)?	1M	3	L1
g)	List the phases of a compiler	1M	4	L1
h)	What is LR Parsing?	1M	4	L1
i)	What is L-Attributed SDD?	1M	5	L1
j)	Define Three Address Code	1M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	Bloom Tx
2	a) Convert the following NFA to an equivalent DFA and explain each step. 	5M	1	L3
	b) Explain the applications of Finite Automata in text search.	5M	1	L4
	OR			
3	a) Design a finite automaton to accept binary numbers divisible by 3.	5M	1	L6
	b) Compare DFA and NFA with suitable examples and diagrams.	5M	1	L5

4	a) Construct a CFG for the language $L = \{a^n b^n \mid n \geq 0\}$. b) Construct Finite Automata for the regular expression, $R = (ab + ba)^*$	5M 5M	2 2	L3 L3
	OR			
5	a) Explain leftmost derivation and rightmost derivation with below example. $S \rightarrow aSb \mid bSa \mid SS \mid \varepsilon$ b) Explain the Pumping Lemma for Regular Languages and its significance.	5M 5M	2 2	L5 L5
6	a) Design a Turing Machine to recognize the language $L = \{0^n 1^n \mid n \geq 1\}$ b) Explain the languages accepted by PDA with an example.	5M 5M	3 3	L6 L5
	OR			
7	a) Explain Instantaneous Description (ID) of a Turing Machine. b) Describe undecidable problems related to Turing Machines.	5M 5M	3 3	L5 L5
8	a) Explain the working of Lex tool in compiler design. b) Explain input buffering techniques in lexical analysis.	5M 5M	4 4	L5 L5
	OR			
9	a) Compare top-down parsing and bottom-up parsing. b) Explain the role of the lexical analyzer in a compiler.	5M 5M	4 4	L4 L5
10	a) Explain stack allocation of space and access to nonlocal data. b) Explain syntax trees and directed acyclic graphs.	5M 5M	5 5	L5 L5
	OR			
11	a) Discuss run-time storage organization in compilers. b) Explain Syntax Directed Definitions (SDD) with examples.	5M 5M	5 5	L6 L5