R22 Regulation *Subject code: 4E5GA&4E5HA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, April 2026

AUTOMATA THEORY AND COMPILER DESIGN

(Common to CSE(AI&ML) & CSE(DS))

Maximum Marks: 60 Date:15.04.2026 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	BTL
1.a)	Can an NFA have more than one transition for the same input symbol?	1M	1	L1
b)	State the role of finite automata in text search applications?	1M	1	L1
c)	What is a leftmost derivation in CFGs?	1M	2	L1
d)	Give an example of a regular language.	1M	2	L1
e)	What is the representation of State Transition in PDA?	1M	3	L1
f)	Define is a Turing Machine?	1M	3	L1
g)	Write about Lex and Lex specifications.	1M	4	L1
h)	Give the purpose of lexical analysis?	1M	4	L1
i)	Define synthesized attribute.	1M	5	L1
j)	What is stack allocation used for in a compiler's run-time environment?	1M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
2	a) Design DFA for the language all strings over {0,1} which are ending with 00.	5M	1	L3
	b) Design Finite Automaton which accepts set of all strings not containing 101 as substring.	5M		L3
	OR			
3	Construct NFA with ε which accepts a language consisting the strings of any no. of 0's followed by any no. of 1's followed by any no. of 2's. And also convert into NFA without ε.	10M	1	L3
4	a) Define Algebraic laws for regular expression.	6M	2	L2
	b) Using Pumping Lemma for regular languages show that $L=\{a^p\}$ where p is a prime number.	4M		
	OR			
5	a) Convert the following Context Free Grammar (CFG) $S \rightarrow AaB \mid aaB$ $A \rightarrow \epsilon$ $B \rightarrow bbA \mid \epsilon$	5M	2	L2
	b) Discuss the Pumping lemma for Context Free Languages concept with example $\{a^n b^n c^n$ where $n>0\}$	5M		L3

6	a) Design Push down Automata for the language $L = \{a^n b^{2n} \mid n \geq 1\}$ b) Design a TM to recognize the language. $L = \{0^n\ 1^n\ 0^n \mid n \geq 1\}$	5M 5M	3	L3 L3
	OR			
7	a) Explain different types of Turing Machine. b) What are undecidable problems? Explain with example.	5M 5M	3	L2 L2
8	a) Describe input buffering in lexical analysis. Why is a two-buffer scheme used? b) Differentiate between top-down and bottom-up parsing.	5M 5M	4	L3 L2
	OR			
9	Write an algorithm for constructing the canonical LR (1) parsing table. Construct canonical LR (1) parsing table for S→CC C→ cC | d	10M	4	L2
10	a) Differentiate between SDD and Syntax-Directed Translation Schemes (SDTs). b) Translate the expression –(a+b)*(c+d)+(a+b+c) into quadruple, triple and indirect triple.	5M 5M	5	L2 L3
	OR			
11	a) Explain heap management in run-time environments. b) How is access to non-local variables implemented on the stack?	5M 5M	5	L2 L2