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

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Regular/Supplementary Examinations, November 2025

AUTOMATA THEORY AND COMPILER DESIGN

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

Maximum Marks: 60 Date: 18.11.2025 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.

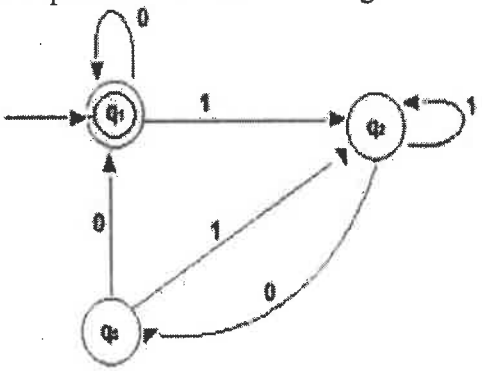
Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	Bloom Tx
1.a)	Write DFA for the language over {0,1} : set of all strings that contain 100 as substring.	1M	1	L1
b)	What is the significance of ε (epsilon) transitions?	1M	1	L1
c)	Define ambiguity in CFG with an example.	1M	2	L1
d)	Write down the formal statement of pumping lemma.	1M	2	L1
e)	Give the formal definition of PDA.	1M	3	L1
f)	Differentiate multihead and multitape Turing Machine.	1M	3	L1
g)	List the types of LR parsers?	1M	4	L1
h)	What are the conflicts occur during shift-reduce parsing.	1M	4	L1
i)	Define syntax-directed definition (SDD)?	1M	5	L1
j)	Give an example of a three-address code instruction.	1M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	Bloom Tx
2	a) Design a DFA to accept even number of a's and even number of b's, where Σ= {a,b}.	5M	1	L3
	b) Give NFA to recognize strings consisting of a, b such that strings contain sub string 'ab' at the end.	5M		L2
	OR			
3	a) Convert the following NFA with ε to equivalent DFA.	5M	1	L2
	b) Write the Differences between Deterministic and Nondeterministic Finite Automata?	5M		L2
4	a) Design a FA for the following Languages i) $(0^*1^*)^*$ ii) (a^*bb^*+bab)	5M	2	L2

	a	b	ε
→P	Φ	P	Q
Q	Q	Φ	R
®	Q	P	Φ

	b) Define Ambiguous Grammar? Check whether the grammar Is Ambiguous or not? S →aAB, A →bC|cd, C→cd, B→c|d	5M		L2
	OR			
5	Construct regular expression for the following finite automata:  	10M	2	L3
6	a) Design a push down Automata for the language L= {WCW^R | W is in (0+1)*}. b) Design Turing machine and its transition diagram to accept the language: L = {$a^n b^n$ | n >=1}	5M 5M	3	L4 L4
	OR			
7	a) Discuss the Equivalence of PDA's and CFG's. b) Explain undecidable problems about Turing Machines.	5M 5M	3	L3 L2
8	a) Construct the predictive parser for the following grammar. S→ (L) | a L→ L, S | S b) Explain the structure of a compiler with a neat diagram and explain the function of each phase briefly.	5M 5M	4	L3 L2
	OR			
9	Construct SLR parsing table for following grammar E → E+T | T T →T*F | F F → (E) | id	10M	4	L3
10	a) Explain the syntax-directed translation. b) What is an L-attributed definition? How is it implemented in a parser?	5M 5M	5	L2 L2
	OR			
11	a) Generate three address code generation for the expression d:=(a-b)+(a-c)+(a-c). b) Explain stack allocation strategy in run-time environments.	5M 5M	5	L2 L2