R18 Regulation *Subject code:2P5EC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, November 2025

THEORY OF COMPUTATION

(CSE)

Maximum Marks: 70 Date: 22.11.2025 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.
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)		Marks	CO	BTL
1	List out the Finite automatons?	2M	1	L1
2	What is an Automata?	2M	1	L1
3	Define Regular Expression.	2M	2	L1
4	Write regular expression for denoting language containing empty string.	2M	2	L1
5	Define Right Linear Grammar.	2M	3	L1
6	Define the language of PDA accepted by final state.	2M	3	L1
7	List and prove any two closure properties of CFL's	2M	4	L1
8	Discuss how Total Turing Machine is Different from Simple Turing Machine.	2M	4	L1
9	Give any two examples of Decidable Problems.	2M	5	L1
10	Define Turing Reducibility	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	Describe Finite automata with output and explain each of them with suitable Examples?	10M	1	L2
	OR			
12	a) Explain the procedure to convert €-NFA to DFA with an example. b) Construct DFA to accept the language of all strings of even numbers of a's & numbers of b's divisible by three over alphabet $\sum$= {a,b} or (a+b)*.	5M 5M	1	L2
13	a) Explain the procedure of converting a regular expression to DFA with an example. b) Prove the following i) ε+1*(011)*(1* (011)*)* = (1+011)* ii) (1=00*1)+(1+00*1)(0+10*1)*(0+10*1) = 0*1(0+10*1)*	5M 5M	2	L2
	OR			
14	a) Let L1 = {010}, L2 = {01,0} then find (i) L1L2 (ii) L1* (iii) $L2^+$ (iv) L1* + L2*	5M	2	L2

	b) Construct Finite Automata for the regular expression 0*1*(101)*11.	5M		
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. Justify your assertion.	10M	3	L2
	OR			
16	Explain various components of context free grammar and derivation tree in detail.	10M	3	L2
17	a) Discuss closure properties of deterministic context free languages. b) When do you say a language L is unambiguous? Show that the language $L=\{a^nb^n \mid n>=1\}$ is unambiguous	5M 5M	4	L2
	OR			
18	a) Design a TM to accept the language L= {w c wR | w ε (a+b)*}. b) Design a TM to recognize all strings consisting of odd number of 1's.	5M 5M	4	L2
19	a) Give definitions of P and NP problems. b) Explain TM halting problem.	5M 5M	5	L2
	OR			
20	a) Explain Chomsky's hierarchy of languages? b) What is post correspondence problem? Verify whether the following PCP has solution or not? A={ba,ab,a,baa,b}, B={ bab,baa,ba,a,aba }	5M 5M	5	L2