



R20 Regulation

Subject code: 3P3HC

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Supplementary Examinations, December 2025

FORMAL LANGUAGE AND AUTOMATA THEORY (CSE(DS))

Maximum Marks: 70

Date: 19.12.2025

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	Define patterns/lexeme/tokens.	2M	1	L1
2	Define – Finite Automata.	2M	1	L1
3	What is a regular expression?	2M	2	L1
4	State Arden's theorem.	2M	2	L1
5	Define – Parse Tree.	2M	3	L1
6	What are the applications of context free languages?	2M	3	L1
7	What is CNF?	2M	4	L1
8	What is a Turing Machine?	2M	4	L1
9	Define Problem Solvable in Polynomial Time.	2M	5	L1
10	What is Church's hypothesis?	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	a) Prove by induction on n $1^2+2^2+3^2+\dots+n^2 = \sum_{i=0}^n i = n(n+1)(2n+1)/6$.	5M	1	L2
	b) Draw transition diagram for recognition the set of all operation in C language.	5M		
OR				
12	a) Conversion of Mealy machine to Moore Machine give one example.	5M	1	L2
	b) Design a Moore machine determine residue module 4 for binary number.	5M		
13	Convert the RE $(b a)^*baa$ into NFA E and find the equivalent minimum state DFA.	10M	2	L2
OR				
14	Explain the DFA Minimization algorithm with an example.	10M	2	L2
15	Explain various components of context free grammar and derivation tree in detail.	10M	3	L2

	OR			
16	Design Push down Automata for the language $L = \{wcw^R \mid w \text{ is in } (a+b)^*\}$.	10M	3	L2
17	a) Write and explain closure properties of Context Free Languages. b) Determine whether the language given by $L = \{a^{n^2} \mid n \geq 1\}$ is context free or not.	5M 5M	4	L2
	OR			
18	Construct a TM for checking the palindrome of a string odd palindrome for $\Sigma = \{0,1\}$	10M	4	L2
19	Explain in brief about Turing Reducibility.	10M	5	L2
	OR			
20	a) Explain in detail about Post Correspondence Problem. b) Explain in detail about Halting problem of TM.	5M 5M	5	L2