Course Code: **23CS5T03**

BONAM VENKATA CHALAMAYYA INSTITUTE OF TECHNOLOGY & SCIENCE

(AUTONOMOUS)

III - B.Tech I-Semester Regular Examinations (BR23), Nov/Dec - 2025

Formal Languages and Automata Theory (CSE)

Time: 3 hours Max. Marks: 70

Question Paper consists of Part-A and Part-B
*Answer **ALL** the question in **Part-A andPart-B***

PART–A (10X2 = 20M)

		Marks	CO	BL
1. a)	Define a finite automaton and write its various applications	(2M)	CO1	1
b)	What is Kleene Closure and Positive Closure? Differentiate with examples.	(2M)	CO1	2
c)	Define regular expression?	(2M)	CO2	1
d)	Write the properties of regular expression.	(2M)	CO2	3
e)	Define Ambiguous Grammars?	(2M)	CO3	1
f)	Write the applications of Context Free Grammars.	(2M)	CO3	3
g)	What isPushdown Automata and draw its model.	(2M)	CO4	2
h)	Write the application of Pushdown Automata.	(2M)	CO4	3
i)	Define Church's Thesis.	(2M)	CO5	1
j)	What is Post's Correspondence Problem(PCP).	(2M)	CO5	3

PART–B (5X10 = 50M)

2a.	Explain the Central Concepts of Automata Theory.	05(M)	CO1	4
b.	Design a DFA L(M) = {w | w ε {0, 1}*} and W is a string that does not contain consecutive 1's.	05(M)		
	(OR)			
3a.	Depict the steps in converting an NFA with ∈ into NFA without ∈ with an example.	05(M)	CO1	5
b.	With an example, explain the procedure for converting a Moore Machine into Melay machine.	05(M)		

4a.	Explain about the identity rules of Regular Expressions?	05(M)	CO2	4
b.	Explain the Pumping lemma for the regular sets.	05(M)		
	(OR)			
5a.	Construct Finite Automata for the regular Expression 1(01+10)*00?	05(M)	CO2	4
b.	Explain about the Closure Properties of Regular sets?	05(M)		

6a.	Convert the grammar into Greibach Normal Form. $S \rightarrow AB$ $A \rightarrow BSB$ $A \rightarrow a$ $B \rightarrow b$	05(M) 05(M)	CO3	5
b.	Obtain the Chomsky normal form for the following grammar E→ E+T/T, T→ a/CE?			
	(OR)			
7a.	Discuss the simplification of context free grammar. What is the importance of useless symbols and unit productions in it?	05(M) 05(M)	CO3	5
b.	Consider the CFG with {S,A,B) as the non-terminal alphabet, {0,1) as the terminal alphabet, S as the start symbol and the following set of production rules $S \rightarrow A1B$ $A \rightarrow 0A / \in$ $B \rightarrow 0B / 1B / \in$ For the string w = 00101, find the Leftmost derivation, Rightmost derivation, and Parse Tree.			

8a.	Define Push Down Automata (PDA). Discuss about the languages accepted by PDA.	05(M) 05(M)	CO4	3
b.	Construct a PDA for $L=\{wcw^R / w \varepsilon (0+1)^*\}$			
	(OR)			
9a.	Show the procedure and explain to find the equivalence of PDA and context free grammar.	05(M) 05(M)	CO4	3
b.	Construct a PDA equivalent to the following grammar: S→ aAA, A →aS|bS|a			

10a.	Explain the differences between NP complete and NP-hard problems.	05(M) 05(M)	CO5	3
b.	Construct Turing machine for $L = \{a^n b^m a^{(n+m)} \mid n,m \geq 1\}$			
	(OR)			
11a.	Write about halting problem in Turing machines.	05(M) 05(M)	CO5	3
b.	Define Turing Machine? Explain about the Model of Turing Machine?			

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