Reg.No.:												

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 50016

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2025
Fifth Semester
Computer Science and Engineering
U19CS522 – THEORY OF COMPUTATION
(Regulation 2019)

Time: Three Hours   Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Define a Finite Automaton with a suitable example.	2	K1	CO1
2.	Differentiate between DFA and NDFA with respect to transitions.	2	K2	CO1
3.	Write a regular expression for strings ending with "01".	2	K1	CO2
4.	List the pumping lemma condition to prove language is regular.	2	K2	CO2
5.	Define a Context-Free Grammar with a simple example.	2	K1	CO3
6.	State Chomsky normal form	2	K1	CO3
7.	Define Instantaneous Description in Pushdown Automata.	2	K1	CO4
8.	Show the pumping lemma for context-free languages.	2	K2	CO4
9.	Outline the Halting Problem in Turing Machines.	2	K2	CO5
10.	Infer the condition for a Turing Machine to accept a string.	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Explain the role of transition functions in Deterministic Finite Automata (DFA) and illustrate your answer with a state diagram and a sample input string.	13	K2	CO1

Q.No.		Questions	Marks	KL	CO
		(OR)			
	b)	Interpret the differences in state behavior between DFA and NDFA with suitable diagrams and examples how each automaton processes input strings.	13	K3	CO1
12.	a)	Explain the equivalence between NFA and DFA. Justify your answer with a suitable example.	13	K2	CO2
		(OR)			
	b)	Outline the process of minimizing a DFA. Outline the steps involved and support with an example.	13	K2	CO2
13.	a)	Organize the concept of ambiguity in context-free grammars with a suitable example.	13	K3	CO3
		(OR)			
	b)	Build the steps involved in simplifying a context-free grammar. Discuss the importance of each step.	13	K3	CO3
14.	a)	Assess the structure and components of a Pushdown Automaton with a simple example.	13	K3	CO4
		(OR)			
	b)	Explain the concept of Instantaneous Description in PDA. Show how it helps trace input processing.	13	K3	CO4
15.	a)	Illustrate the basic structure and working of a Turing Machine with a simple example.	13	K2	CO5
		(OR)			
	b)	Discuss the concept of the Halting Problem. Write its significance with detailed procedure.	13	K2	CO5

PART – C

(1 x 15 = 15Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Elaborate on the various techniques for Turing machine construction and highlight the features of each. With real time applications.	15	K3	CO5
		(OR)			
	b)	A vending machine accepts coins in denominations of ₹1 and ₹2. It dispenses a product only when the total amount reaches ₹5. Design a DFA to model this behavior. Explain the states, transitions, and acceptance condition with a state diagram and sample input.	15	K3	CO1