DEPARTMENT OF

INFORMATION SCIENCE & ENGINEERING

Date	7th September 2023	Maximum Marks	50
Course Code	21IS44	Duration	90 Mins
Sem	IV Semester	IMPROVEMENT CIE	

THEORY OF COMPUTATION

Sl. No.	Questions	M	BT	CO
1	Define turing machine and the language of turing machine. Design a TM which multiplies 2 unary numbers. Hint: input = B0mB0nB Output = 0mn Give the sequence of ID's for the strings m=5, n=2.	10	L3	CO 4
2.a	Summarize the following concepts of Turing machine: i) Non – deterministic TM. ii) Multi-tape TM.	06	L2	CO 1
2.b	Write a note on Chomsky hierarchy of languages.	04	L1	CO 2
3.a	Prove that union of two recursive languages is recursive and intersection of two recursively enumerable languages is recursively enumerable.	06	L2	CO 3
3.b	Define PCP. Does PCP with two lists x=(10, 011, 101) and y=(101, 11, 011) have a solution. Analyze your answer.	04	L3	CO 1
4.a	Design LBA for the language L = $\{a^n b^n c^n \mid n \geq 1\}$.	07	L3	CO 4
4.b	Illustrate the halting problem of Turing Machine with an example.	03	L2	CO 1
5.a	Obtain turing machine to compute n mod 2, where n denotes the length of the string constructed over the unary input symbol $\Sigma = \{1\}$.	04	L3	CO 4
5.b	Define unrestricted grammar. Give unrestricted grammar to generate the language L = $\{a^n b^n c^n \mid n \geq 1\}$. Show that the string aabbcc is generated.	06	L2	CO 1

BT-Blooms Taxonomy, CO-Course Outcomes, M-Marks

Marks Distribution	Particulars		CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L6
	Test	Max Marks	19	04	06	21	04	21	25	--	--	--

CO1:	Describe the fundamental concepts of automata theory and formal languages.
CO2:	Apply automata theory skills to describe computational problems effectively
CO3:	Analyze the limitations and equivalence of different computing models
CO4:	Design finite automata and computing model to solve problems in the field of computer science.

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