Date: 02/06/2022

K. J. Somaiya Institute of Engineering and Information Technology, Sion, Mumbai-22

(Autonomous College Affiliated to University of Mumbai)

End Semester Exam

May– June 2022

(B.Tech) Program: Information Technology

Examination: SY Semester: IV

Course Code: **1UITC404** and Course Name: Automata Theory

Duration: 03 Hours   Max. Marks: 60

Instructions:

(1) All questions are compulsory.

(2) Draw neat diagrams wherever applicable.

(3) Assume suitable data, if necessary.

		Max. Marks	CO	BT level
Q 1	**Solve any six questions out of eight:**	12		
i)	Explain operations of regular expression.	2	CO1	Understand
ii)	Explain Nondeterministic Finite Automata.	2	CO2	Understand
iii)	Explain Context Free Grammar.	2	CO3	Understand
iv)	Explain types of grammar accepted by automata.	2	CO3	Understand
v)	Explain advantages of Pushdown Automata.	2	CO4	Understand
vi)	Explain Mealy Machine with example.	2	CO2	Understand
vii)	Explain Turing Machine.	2	CO5	Understand

viii)	Explain any two applications of Pushdown Automata.	2	CO6	Understand
Q.2	Solve any four questions out of six.	16		
i)	Design Regular Expression for the set of all strings containing at most 2 a's.	4	CO1	Create
ii)	Design Deterministic Finite Automata to accept set of strings where the number of 1's in every string is multiple of 3. $\sum = \{0,1\}$	4	CO2	Create
iii)	Examine is the following grammar ambiguous? S -> SaS | b	4	CO3	Analyze
iv)	Construct Pushdown Automata for the language L = {ww^R| w ε { a, b }* }	4	CO4	Create
v)	Describe deterministic and non-deterministic Turing Machine.	4	CO5	Understand
vi)	Discuss applications of Pushdown Automata in detail.	4	CO6	Understand
Q.3	Solve any two questions out of three.	16		
i)	Construct PDA for the language: L= { ẇ ε { a, b }* | w has the equal number of a's and b's }	8	CO4	Create
ii)	Design Turing Machine for L = { 0^n 1^n| n >= 1} with the help of suitable State-Transition diagram. Show the computation of sample string.	8	CO5	Create
iii)	Discuss applications of Finite Automata and Context Free Grammar in detail.	8	CO6	Understand
Q.4	Solve any two questions out of three.	16		
i)	Write and explain an algorithm for conversion of let-linear grammar to equivalent right-linear grammar. Also, convert following left-linear grammar to equivalent right-linear grammar:	8	CO1	Understand

	S -> B1 | A0 | C0 A -> C0 | A1 | B1 | 0 B -> B1 | 1 C -> A0			
ii)	Differentiate between Moore Machine and Mealy Machine with suitable example.	8	CO2	Analyze
iii)	Explain Context-Free Grammar and Convert following Context-Free grammar to Chomsky Normal Form: S -> AS | AAAS, A -> SA|aa|b	8	CO3	Create