

K. J. Somaiya Institute of Technology, Sion, Mumbai-22
 (Autonomous College Affiliated to University of Mumbai)

August - 2023		
(B.Tech) Program: Information Technology	Scheme- II	
Examination: SY Semester: IV		
Course Code: ITC404 and Course Name: Automata Theory		
Date of Exam: 23/8/23	Duration: 2.5 Hours	Max. Marks: 60

Instructions:
 (1) All questions are compulsory.
 (2) Draw neat diagrams wherever applicable.
 (3) Assume suitable data, if necessary and state it clearly.

	Question	Max. Marks	CO	BT Level
Qu-1	Solve any SIX questions out of EIGHT .	12		
i)	Define the terms "halting state" and "accepting state" in the context of Turing machines.	2	CO5	1
ii)	Explain the concept of a transition function in a Turing machine.	2	CO5	2
iii)	Define a Pushdown Automaton and its key components.	2	CO4	1
iv)	What is the purpose of using regular expressions in automata theory?	2	CO1	1
v)	Explain the concept of language acceptance by a finite automaton.	2	CO1	1
vi)	Define the concept of a context-free grammar (CFG) and explain its components.	2	CO3	1
vii)	What is the language accepted by a finite automaton?	2	CO2	1
viii)	What are the phases of compilers?	2	CO6	2
Qu-2	Solve any FOUR questions out of SIX .	16		
i)	Compare and contrast Turing machines and finite automata, highlighting their similarities.	4	CO2	2
ii)	Given a pushdown automaton (PDA), determine whether it accepts the language of all palindromes over the alphabet {0, 1}.	4	CO3	3
iii)	Explain Halting problem.	4	CO5	2
iv)	Why context-free grammar (CFG) matches pushdown automata for acceptance of L?	4	CO1	2
v)	Differentiate between Compiler and Interpreter.	4	CO6	2

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vi)	Discuss formal definition of Push Down Automata.	4	CO4	2
Qu-3	Solve any TWO questions out of THREE.	16		
i)	Define the concept of a regular expression and explain how it can be used to represent regular languages.	8	CO2	2
ii)	Classify grammars with their machines.	8	CO4	4
iii)	Construct a PDA which recognizes all strings of palindromes with example	8	CO5	6
Qu-4	Solve any TWO questions out of THREE.	16		
i)	Design DFA for strings over the binary alphabet that contains the substring 00.	8	CO2	6
ii)	Explain Closure Properties.	8	CO1	2
iii)	Design a context-free grammar (CFG) for the language $L = \{a^n b^n c^n \mid n \geq 0\}$	8	CO3	6
