

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE						
Regular/ Supplementary Winter Examination – 2024						
Course: B. Tech		Branch : Computer Engineering/Computer Science and Engineering				
Subject Code & Name: BTCOC502, Theory Of Computation				Semester: V		
Max Marks: 60		Date: 08/02/2025		Duration: 3 Hr.		
Instructions to the Students: 1. Each question carries 12 marks. 2. Question No. 1 will be compulsory and include objective-type questions. 3. Candidates are required to attempt any four questions from Question No. 2 to Question No. 6. 4. The level of question/expected answer as per OBE or the Course Outcome (CO) on which the question is based is mentioned in () in front of the question. 5. Use of non-programmable scientific calculators is allowed. 6. Assume suitable data wherever necessary and mention it clearly.						
					(Level/CO)	Marks
Q. 1	Objective type questions. (Compulsory Question)					12
1	Which of the following is not a part of 5-tuple finite automata?				Understand	1
	a. Input alphabet	b. Transition function	c. Initial State	d. Output Alphabet		
2	RR* can be expressed in which of the forms:				Analyze	1
	a. R^+	b. $R^+ \cup R$	c. $R^* \cup R$	d. R^*		
3	The number of states required by an automaton to accept string 101 are				Analyze	1
	a. 3	b. 4	c. 5	d. 2		
4	Regular expression for string that start with ab and end with ba is				Design	1
	a. aba^*b^*ba	b. $ab(ab)^*ba$	c. $ab(a+b)^*ba$	d. All of these		
5	Regular expressions are closed under				Understand	1
	a. Union	b. Concatenation	c. Kleene Star	d. All of these		
6	Which grammar is in Greibach normal form (GNF) ?				Understand	1
	a. $S \rightarrow AA 0$, $A \rightarrow SS 1$	b. $A \rightarrow aB$ $B \rightarrow b$	c. $A \rightarrow aBd$ $B \rightarrow b$	d. None of these		
7	Moore machine produces output over the change of				Understand	1
	a. transitions	b. state	c. input symbol	d. None of these		
8	Can Deterministic Finite automata determine palindrome number ?				Analyze	1
	a. yes	b. no	c. yes for some cases	d. yes for Σ^*		

9	A grammar that produces more than one parse tree is called				Understand	1
	a. regular	b. ambiguous	c. unambiguous	d. linear		
10	The language accepted by Pushdown automata is				Understand	1
	a. type 0	b. type 1	c. type 2	d. type 3		
11	The language is recognized by Turing machine if it is generated by _____ grammar				Understand	1
	a. type 0	b. type 1	c. type 2	d. type 3		
12	The Pushdown automata behaves like Turing machine if it has auxiliary memory				Understand	1
	a. 0	b. 2	c. 2 or more	d. none of these		
Q. 2	Solve the following.					12
A)	State some applications of regular expressions . Write regular expressions for the following (i) one 'a' followed by some number of b's . (ii) some positive number of a's followed by exactly one b . (iii) start and end with a and in between only some b's.				Create	6
B)	Design deterministic finite automaton which consists of strings of 0's and 1's but ends with string 00, over alphabet $\Sigma = \{0,1\}$.				Design	6
Q.3	Solve the following.					12
A)	Construct an epsilon non deterministic finite automata (ϵ - NFA) accept either a or abb or a^*b^+ .				Create	6
B)	Distinguish between Moore machine and Mealy machine .				Understand	6
Q. 4	Solve Any Two of the following.					12
A)	Let the grammar consists of following productions . $S \rightarrow aAS \mid a$ $A \rightarrow SbA \mid SS \mid ba$ Find the leftmost and rightmost derivations for string aabbbaa. Also draw the parse trees.				Apply	6
B)	Explain Chomsky classification of grammar.				Understand	6
C)	Construct finite automaton for the following grammar. $S \rightarrow aA \mid \epsilon$, $A \rightarrow aA \mid bB \mid \epsilon$, $B \rightarrow bB \mid \epsilon$					6
Q.5	Solve Any Two of the following.					12
A)	Find the reduced grammar equivalent to following context free grammar where $V=(A,B,C,S)$ $T=(a,b)$ and $P = (S \rightarrow AB \mid CA ,$				Apply	6

	$B \rightarrow BC AB, A \rightarrow a, C \rightarrow aB b$).		
B)	Explain the components of Pushdown automata.	Understand	6
C)	Explain with example how Pushdown automata is represented using transition diagram and transition table .	Understand	6
Q. 6	Solve Any Two of the following.		12
A)	Distinguish between tape and head of Turing machine and Pushdown automata.	Understand	6
B)	Design Turing machine to accept the language of 0's and 1's ending with 00.	Design	6
C)	Give an example of Turing machine which has an infinite loop and never halts .	Analyze	6
	*** End ***		