



VIT

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

REG.NO.:

SCHOOL OF COMPUTER SCIENCE ENGINEERING AND INFORMATION SYSTEMS
CONTINUOUS ASSESSMENT TEST - I
FALL SEMESTER 2026-2027

SLOT: A1+TA1+TAA1

Programme Name & Branch : BTECH - Computer Science and Engineering (Artificial Intelligence and Data Engineering), BTECH - Computer Science and Engineering (Cyber Security)
Course Code and Course Name : BACSE201 - Models Of Computation
Faculty Name(s) : Dr. Sivashankari R (11995), Dr. Dharmendra Singh Rajput (14049), and Dr. Yusuf Akhtar (22528).
Class Number(s) : VL2026270103384, VL2026270102657, and VL2026270103387
Date of Examination : 9th August 2026, 9:30 am - 11 am (Session 1).
Exam Duration : 90 minutes **Maximum Marks: 50**

General instruction(s):

- Answer All Questions
- M - Max mark; CO - Course Outcome; BL - Blooms Taxonomy Level (1 - Remember, 2 - Understand, 3 - Apply, 4 - Analyse, 5 - Evaluate, 6 - Create)
- Course Outcomes
 1. Apply various proof techniques such as induction, contradiction, and contraposition in the context of formal languages and automata
 2. Design and analyze finite automata and regular expressions to solve lexical analysis problems and recognize regular languages

Q. No	Question	M	CO	BL
1.	Using induction, show that $((x+10)^2)/225 \geq (x+5)/10$ for $x \geq 5$.	10	1	2
2.	(a) Convert the following Deterministic Finite Automata (DFA) to a regular expression. <pre>graph LR; S1((S1)) -- 0 --> S2((S2)); S2 -- "0, 1" --> S3(((S3))); S1 -- 1 --> S3; S3 -- "0, 1" --> S3;</pre>	5	2	2
	(b) Consider the regular language L consisting of all binary strings with exactly one substring of "01". For example, "00001" is a valid string since there is only one "01". The string "00010100" is not valid since there are two "01"s. The string "000100100" is not valid since there are two "01"s. The string "1111000" is not valid since there is no substring of "01". The string "11110001" is valid since there is exactly one substring of "01". Convert L into a regular expression.	5		
3.	Consider a person tossing three coins A, B, and C in the order: A, B, and C. The person wins if two or three coins turn out to be heads (H). Using a finite automata, show the set of head/tail (T) combinations that result in the person winning the game. For example, HTH and THH are possible combinations of coin tosses if the person has to win the game.	10	2	3



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4.	For the following ϵ -Nondeterministic finite automata, determine $\delta^*(\text{"0110"})$.			
		10	2	3
5	(a) Show that the regular expressions $(01)^*(\epsilon+0)+(10)^*(\epsilon+1)$ and $(\epsilon+0)(10)^*(\epsilon+1)$ are equivalent.	5	2	3
	(b) Convert the regular expression $(0+1)^*(01)$ to a DFA.	5		
