REG.NO.:

VIT
Vellore Institute of Technology

SCHOOL OF COMPUTER SCIENCE ENGINEERING AND INFORMATION SYSTEMS
CONTINUOUS ASSESSMENT TEST - I
WINTER SEMESTER 2024-2025

SLOT: C1+TC1+TCC1

Programme Name & Branch	**: B.Tech. & IT**
Course Code and Course Name	**: Theory of Computation & BITE306L**
Faculty Name(s)	**: Prof Dharmendra Singh Rajput, Prof Chiranji Lal Chowdhary, Prof Harshita Patel**
Class Number(s)	**: VL2024250503400, VL2024250503394, VL2024250503405**
Date of Examination	**: 29th January 2025, Wednesday**
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: CO1, CO2.

Q. No	Question	M	CO	BL
1.	Find the regular expressions for the following languages on $\{a, b\}$ **[2 marks each]** a) $L = \{a^n b^m : n \geq 4, m \leq 3\}$. b) The complement of L in a). c) All strings that do not end with aa. d) The language that contains all strings over $\{a,b\}$ whose length is divisible by 3 and leaves remainder b. e) The language accepting all the string which are starting with b and ending with a, over $\Sigma = \{a,b\}$.	10	2	3
2.	Deduce the following ε-*NFA* to *NFA*. Starting state : q0 Final State : q2	10	1	4
3.	a) Construct a *DFA* that accepts all the strings over $\Sigma = \{a,b\}$ whose length is divisible by 6. b) Convert the following *NFA* to *DFA*. Starting state: q0 Final States: {q1, q3}	4 6	1	2
4.	a) Design a Moore machine that accepts strings over the alphabet $\Sigma=\{a,b\}$ such that (i) The output is *1* if the string ends with *"ab"*, otherwise *0*. (ii) For instance, for the input *"abab"*, the corresponding output should be *0001*. Draw the state diagram. Clearly define the transition and output functions.	5	1	5

	a	b	c	ε
-> q0	q0	∅	∅	q1
q1	∅	q1	∅	q2
* q2	∅	∅	q2	∅

δ	0	1
→ q0	{q1, q3}	q1
* q1	q2	{q1, q2}
q2	q3	q0
*q3	∅	q0

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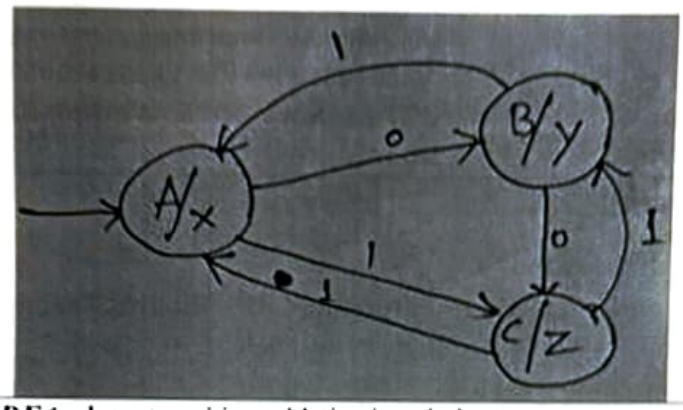
	b) Convert the following Moore machine into an equivalent Mealy machine.  	5		
5.	Minimize the ***DFA*** whose transition table is given below: Starting State: ***q0*** Final State: ***{q2, q4}***	10	1	6

δ	0	1
q0	q1	q5
q1	q2	q3
q2	q2	q4
q3	q2	q5
q4	q2	q4
q5	q5	q5
q6	q5	q6

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