



VIT

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

REG.NO.:

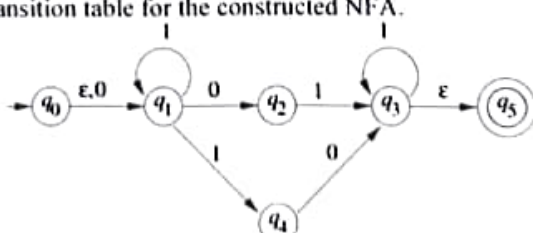
SCHOOL OF COMPUTER SCIENCE ENGINEERING & INFORMATION SYSTEMS
CONTINUOUS ASSESSMENT TEST - I
WINTER SEMESTER 2024-2025

SLOT: C2+TC2+TCC2

Programme Name & Branch : B.Tech (IT)
Course Code and Course Name : BITE306L, Theory of Computation
Faculty Name(s) : Dharmendra Singh Rajput, Chiranjil Chowdhary,
Harshita Patel
Class Number(s) : VL2024250503403, 3396, 3409
Date of Examination : 29/01/2025
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 (Type the CO statements covered in this question paper. Use the CO number as per the syllabus copy)
 1. Analyze the deterministic finite machine and non-deterministic finite automata to accept the languages.
 2. Use and apply important properties of finite automaton to derive regular expressions from finite automation and vice versa.

Q. No	Question	M	CO	BL
1.	Construct a Minimal DFA that accepts all strings of a's & b's for the following languages: i. $L = \{a^n b^m \mid n \geq 2, m \geq 1\}$ ii. $L = \{w \mid n_a(w) \bmod 3 \neq 1\}$ Also, demonstrate the DFA's acceptance or rejection by few valid and invalid strings.	5+5	1	6
2.	Construct an NFA that is equivalent to the given finite automaton. Determine the regular language accepted by the NFA. Finally, provide a neatly formatted transition table for the constructed NFA. 	10	1	6
3.	How do unreachable states affect the minimization process? Given a DFA, apply the minimization algorithm to construct an equivalent DFA with the minimum number of states.	2+8	1	3



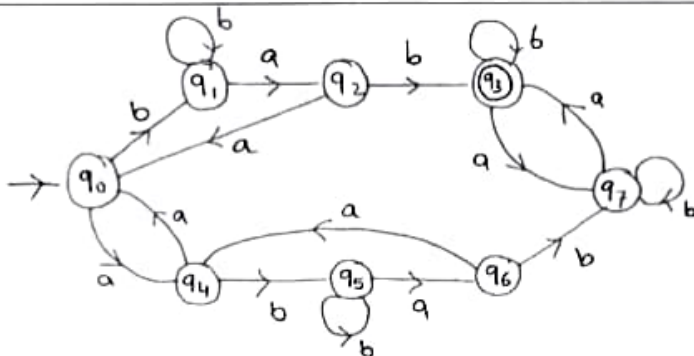
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4.	Differentiate between finite automata with output and finite automata without output. Design a Moore machine for a binary input sequence such that if it has a substring 101, the machine output A, if the input has substring 110, it outputs B otherwise it outputs C.	2+8	1	3
5.	Describe the relationship between regular expressions, deterministic finite automata (DFAs), and non-deterministic finite automata (NFAs) in the context of formal language theory. Find the regular expression for the following regular languages: a. All the string of 0's & 1's where the 2 nd symbol from the right end of the string is always 0. b. All the string which should have at least one 0 and at least one 1.	4+3+3	2	3
