VIT
Vellore Institute of Technology
CHENNAI

Reg. Number:	

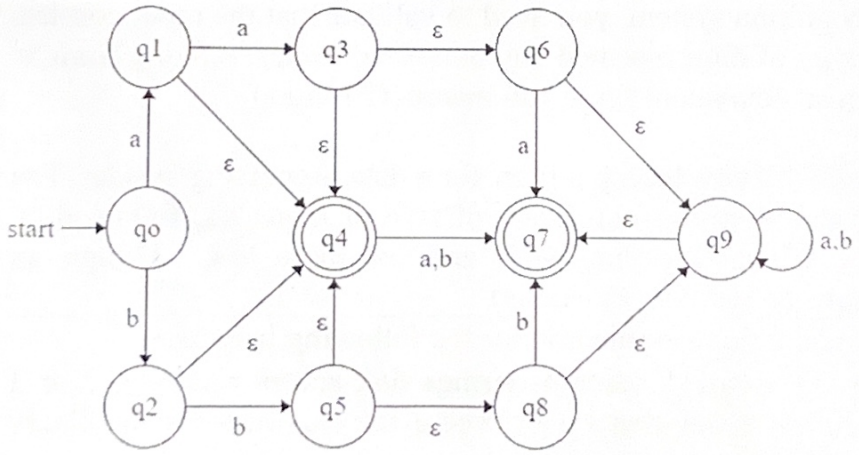
Continuous Assessment Test (CAT) – I AUGUST 2024

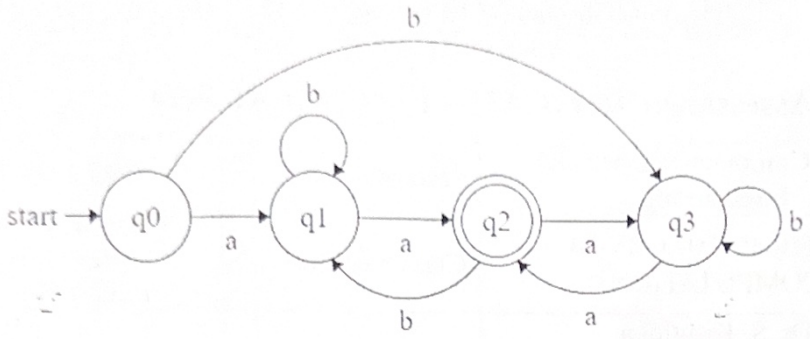
Programme	:	BTech Computer Science and Engineering	Semester	:	FALL 24-25
Course Code & Course Title	:	BCSE304L THEORY OF COMPUTATION	Class Number	:	CH2024250101445 CH2024250100914 CH2024250100900
Faculty	:	Dr. S. Kiruthika Dr. T. Nathezhtha Dr. Tahir mujtaba	Slot	:	A1+TA1
Duration	:	90 MINUTES	Max. Mark		50

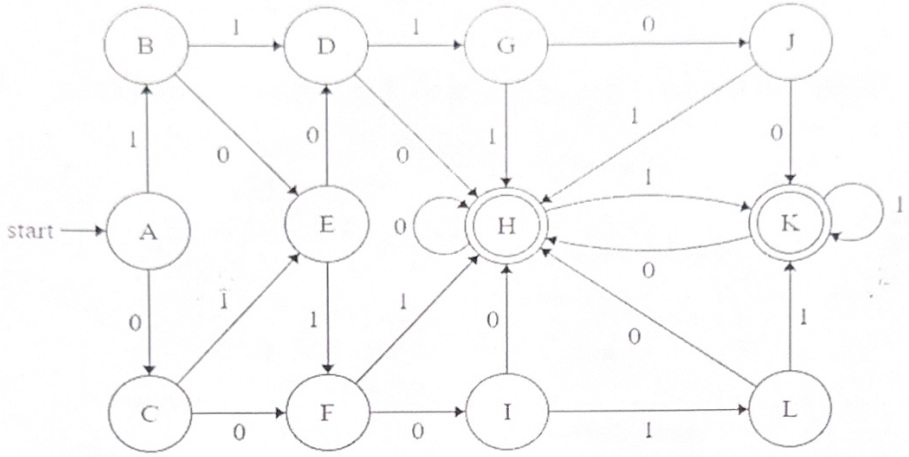
General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information.
- Use statistical tables supplied from the exam cell as necessary
- Use graph sheets supplied from the exam cell as necessary
- Only non-programmable calculator without storage is permitted

Answer all questions

Q. No	Description	Marks
1.	For the following ε -NFA construct an equivalent DFA. 	10
2.	Derive the regular expression for the given finite automata.	10

		
3.	a) You are designing a communication protocol for a system where messages consist of pairs of characters. Each message is formed by repeating the pair "ab" zero or more times. Design an equivalent finite automaton. (2 Marks) b) You are building a text parser that needs to accept strings made up of one or more occurrences of the characters 'a' or 'b'. Design an equivalent finite automaton. (2 Marks) c) You are developing a validation tool that needs to check if a string starts with 'a', followed by zero or more 'b's, and ends with one or more 'c's. Design an equivalent finite automaton. (2 Marks) d) In a digit recognition system, you need to validate that the input consists of only one type of digit repeated any number of times, ranging from '0' to '4'. Design an equivalent finite automaton. (2 Marks) e) You are asked with developing a filter for a data processing system. The filter should accept strings consisting of zero or more 'a's, followed by one or more 'b's, and ending with zero or more 'c's. Design an equivalent finite automaton. (2 Marks)	10
4.	Construct a deterministic finite automaton for the following languages, a) $L_1 = \{w \mid w \in \sum = \{0,1\}^*$ contains strings that accept reminder 2 or 3 when the number is divided by 4, where the numbers are in binary form$\}$. (5 Marks) b) $L_2 = \{w \mid w \in \sum = \{0,1\}^*$ contains the strings that ends with three consecutive 0's or three consecutive 1's$\}$. (5 Marks)	10
5.	Construct a minimized deterministic finite automaton for the automation given below.	10



**********All the best **********