REG.NO.:

VIT

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

SLOT: F1+TF1

School of Computer Science and Engineering

CONTINUOUS ASSESSMENT TEST - I
WINTER SEMESTER 2024-2025

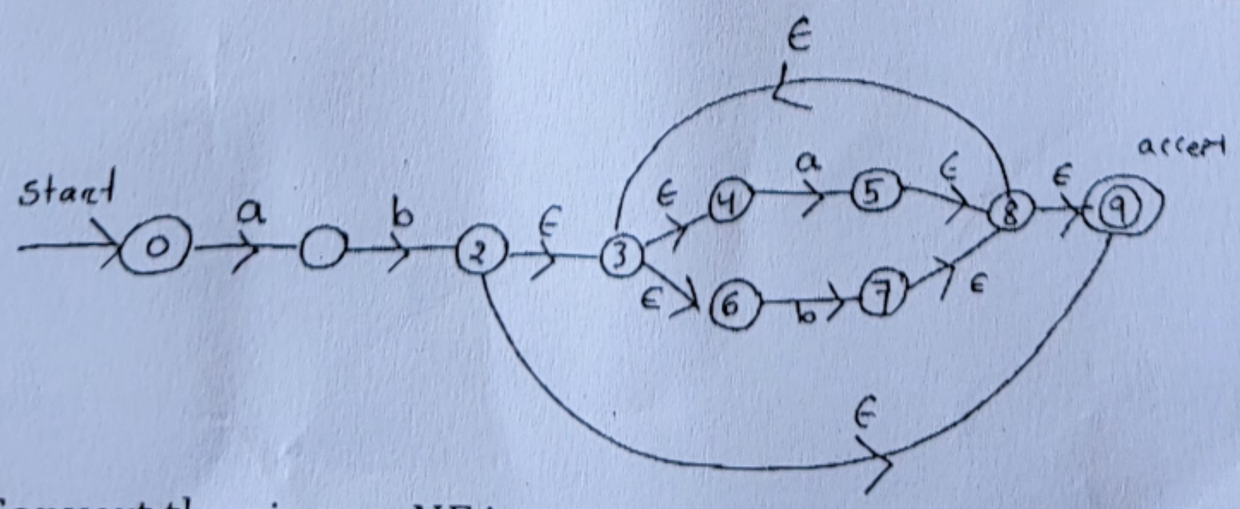
Programme Name & Branch:Btech, CSE
Course Code and Course Name : BCSE304L and Advanced Theory of Computation
Faculty Name(s) : KANAGARAJ R, MADIAJAGAN M, SATHIYA KUMAR C, KARTHIK G M, BASKARAN P, PARTHASARATHY G , SARITHA MURALI , RAJARAJAN G , SHALINI L, UMA PRIYA D , BOOMINATHAN P, LAKSHMANAN K, BHAWANA TYAGI , BHUVANESWARI M, IYAPPAN P, ISLABUDEEN M, PRAKASH M, SATHYA K, ADRIJA BHATTACHARYA, DEBI PRASANNA ACHARJYA, K.Krishna Rani Samal,SUGANTHINI C

Class Number(s) :VL2024250501633,VL2024250501615, VL2024250501619, VL2024250501625, VL2024250501637,VL2024250501639,VL2024250501635,VL2024250501653,VL20242505016 31,VL2024250501643,VL2024250501617,VL2024250501651,VL2024250501649,VL202425050 1645,VL2024250501627,VL2024250501647,VL2024250501629,VL2024250501641,VL2024250 501623, VL2024250501613, VL2024250501621, VL2024250501655

Date of Examination : 01-Feb-2025, 09:30 AM - 11:00 AM
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)

Q. No	Question	M	CO	BL
1	a)Consider the Fibonacci sequence $\{x_n\}_{n=1}^{\infty}$, defined by the relations $x_1 = 1, x_2 = 1$ and $x_n = x_{n-1} + x_{n-2}$ for $n \geq 3$. I. Use an extended Principle of Mathematical Induction in order to show that for n ≥ 1, $x_n = \frac{1}{\sqrt{5}} \left[\left(\frac{1+\sqrt{5}}{2} \right)^n - \left(\frac{1-\sqrt{5}}{2} \right)^n \right]$ II. Compute x_{20}	5	4	2
	b) Formally define DFA machine M and language L(M) accepted by M. [2M] c) Correlate formal grammars, languages with their respective computational models. [3M]	5		
2.	 I. Convert the given ε-NFA to its equivalent DFA. Draw the DFA diagram. II. Determine whether minimization of the resulting DFA is possible. Explain your answer.	10	1	3

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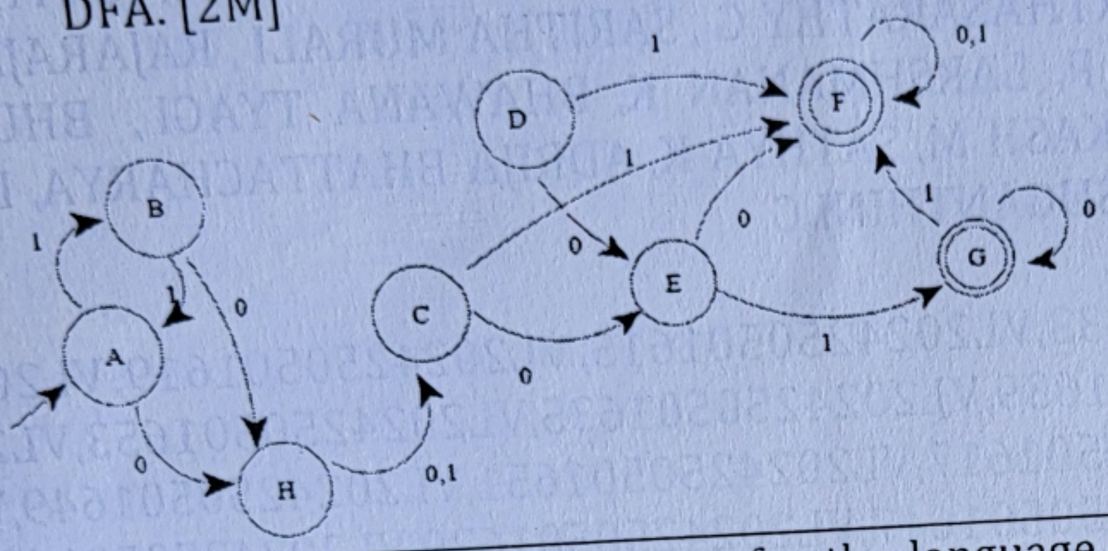
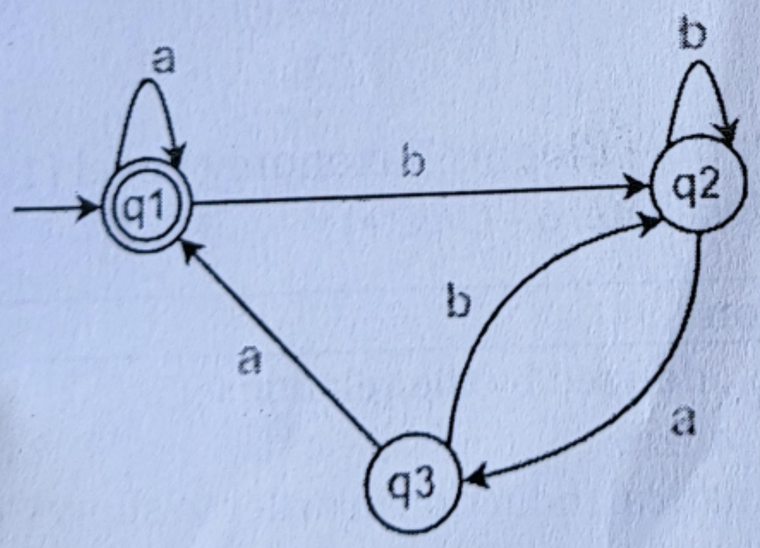
3	I. Consider the following DFA. Determine whether it is already a minimized DFA by demonstrating the equivalence steps. [8M] II. If it can be further minimized, draw the diagram of the final minimized DFA. [2M] 	10	1	3
4	I. Write the regular expression for the language accepting all the string of odd length over $\sum = \{a, b\}$. [3M] II. b)Find regular expression for the following DFA. [7M] 	10	2	3
5	I. *Obtain an Epsilon NFA for regular expression (ab+a)* (ba+ab+b*a) over $\Sigma=\{a,b\}$* [5M] II. *Prove* $\varepsilon + 1^*(011)^*(1^*(011)^*)^* = (1 + 011)^*$ [5M]	10	2	2