



VIT

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

REG.NO.: 23BCE0969

School of Computer Science and Engineering

SLOT: F1+TF1

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, VL2024250501631, VL2024250501643, VL2024250501617, VL2024250501651, VL2024250501649, VL2024250501645, VL2024250501627, VL2024250501647, VL2024250501629, VL2024250501641, VL2024250501623, 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	<p>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 $n \geq 3$.</p> <p>I. Use an extended Principle of Mathematical Induction in order to show that for $n \geq 1$,</p> $x_n = \frac{1}{\sqrt{5}} \left[\left(\frac{1+\sqrt{5}}{2} \right)^n - \left(\frac{1-\sqrt{5}}{2} \right)^n \right]$ <p>II. Compute x_{20}</p> <p>b) Formally define DFA machine M and language L(M) accepted by M. [2M]</p> <p>c) Correlate formal grammars, languages with their respective computational models. [3M]</p>	5	4	2
2	<p>I. Convert the given ϵ-NFA to its equivalent DFA. Draw the DFA diagram.</p> <p>II. Determine whether minimization of the resulting DFA is possible. Explain your answer.</p>	10	1	3



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