REG.NO.:

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

SCHOOL OF COMPUTER SCIENCE ENGINEERING AND INFORMATION SYSTEMS
CONTINUOUS ASSESSMENT TEST - II
WINTER SEMESTER 2025-2026

SLOT: B1+TB1

Programme Name & Branch	**: B.Tech & CSE (AIDE and CS)**
Course Code and Course Name	**: BCSE304L and Theory of Computation**
Faculty Name(s)	**: Dr. Uma Maheswari G, Dr Pradeepa M, Dr. Raghavan R**
Class Number(s)	**: VL2025260503588, VL2025260503565, VL2025260503590**
Date of Examination	**: 16.3.2026**
Exam Duration	**: 90 minutes** **Maximum Marks: 50**

General instruction(s):

Answer All Questions

Include steps (mandatory) and Diagrams (if needed)

M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)

Course Outcomes

2. Apply rigorously formal mathematical methods to prove properties of languages, grammars and automata
3. Identify limitations of some computational models and possible methods of proving them
4. Represent the abstract concepts mathematically with notations

Q. No	Question	M	CO	BL
1a	L = { w ∈ {a, b}* | w contains aa as a substring}. Find complement of L and Prove that regular languages are closed under complementation	5	CO2	3
1b	Let Σ = { a, b, …, z, A, B, …, Z } and consider the languages over Σ as Noun, Verb and The as mentioned below Noun = { Puppy, Rainbow, Whale, … } Verb = { Hugs, Juggles, Loves, … } and The = { The } Prove that the regular languages are closed under concatenation.	5		
2a	Check whether the given language is ambiguous or inherently ambiguous $L = \{0^i1^j2^k \mid i=j \text{ or } j=k\}$	5	CO2	2
2b	Show that $L= \{0^p \mid p \text{ is prime}\}$ is not regular using pumping lemma. Include all the associated steps. **(PTO)**	5		

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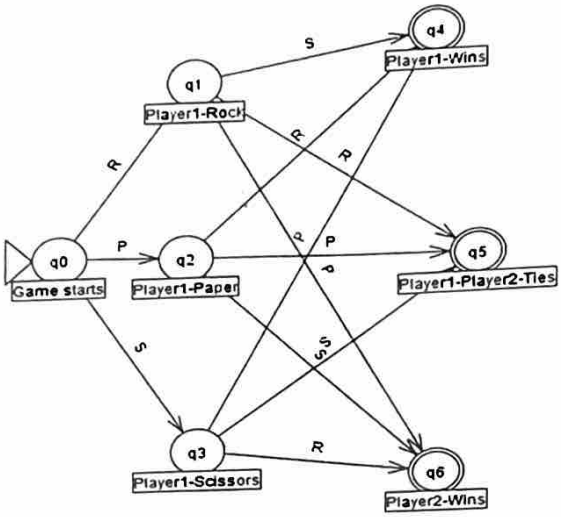
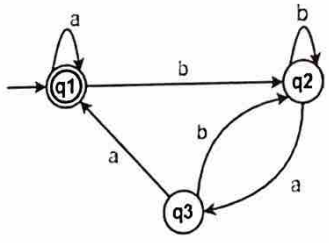
3a	Convert the following Deterministic Finite Automaton to Regular Grammar (q0 is the initial state and q4,q5,q6 are final states). 	5	CO3	3
3b	Convert the obtained regular grammar in question 3a to the corresponding regular expression.	5		
4	Bring the grammar G with V={S, A, B}, T={a, b} and productions P $S \rightarrow A$ $A \rightarrow a\ B\ a \mid a$ $B \rightarrow b\ A\ b \mid b$ into Greibach Normal Form.	10	CO4	3
5a	Find the regular expression for the following DFA using Arden's theorem. 	5	CO2	3
5b	Construct a Context Free Grammar for (0+1)*111. Verify the constructed grammar using valid strings.	5		