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Vellore Institute of Technology
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School of Computer Science and Engineering

Winter Semester 2022-2023

Continuous Assessment Test – 1

Programme Name &Branch : B.Tech **SLOT C2**

Course Name & code: Theory of Computation & BCSE304L

Class Number (s): VL2022230502938, 2930,2939,4336,2948, 2951,2941,2949,2928, 2936, 2934

Faculty Name (s): Prof. Gopichand G, Prof. Navamani T M, Prof. Madiajagan M, Prof. Arup Ghosh, Prof. Vishnupriya A , Prof. Mohana CM, Prof. Saritha Murali , Prof. Alkha Mohan , Prof. Bhuvaneswari M, Prof. Sathya K , Prof. Baskaran P, Prof. Sarwesh P , Prof. Umamaheswari M, Prof. Santhi K, Baiju B V, Prof. Anbarasi M

Exam Duration: 90 Min. **Maximum Marks: 50**

Q.No.	Question	Max Marks
1.	Construct an equivalent DFA for the following state table, Input / State | ε | a | b | c ➔ q_0 | { q_2 , q_1} | ϕ | { q_1} | { q_2} q_1 | ϕ | { q_0} | { q_1 } | { q_1 , q_0} q_2^* | ϕ | ϕ | ϕ | ϕ	10
2.	Design NFA, over string { 0,1} for accepting the string that has the number of 0's as even length and the number of 1's as odd length. Prove the same by parsing the following using extended string conversion function "00001" and "01001" .	10
3.	a) Given a grammar G =(V,T,E,P) over set of alphabets ∑ = {0,…,9, +, *, (,)} with productions E -> I , E -> E + E , E -> E * E , E -> (E) I -> ε | 0 | 1 | … | 9 & derive string **3*(7*(2+5))** b) For the given alphabet Σ = { y, a, b}, find what is i) Σ^2 ii) Σ^0 iii) Σ^+ iv) Σ^* v) Σ^* - {ε}	10 (5+5)

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<td>4.</td>
<td>a) Construct a DFA for accepting numbers that are divisible by 2 and 5 over the input alphabets Σ= {0,1,2,3,4,5,6,7,8,9}.

b) Find minimized DFA for the following using the Myhill nerode theorem.

<table>
<tr><td>State/input</td><td>a</td><td>b</td></tr>
<tr><td>->0</td><td>1</td><td>5</td></tr>
<tr><td>1</td><td>2</td><td>3</td></tr>
<tr><td>2</td><td>1</td><td>3</td></tr>
<tr><td>3</td><td>1</td><td>4</td></tr>
<tr><td>4</td><td>1</td><td>5</td></tr>
<tr><td>5*</td><td>2</td><td>5</td></tr>
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<td>10
(5+5)</td>
</tr>
<tr>
<td>5.</td>
<td>a) Using induction proves the following

i. If W is a set then |W|=n then |W^r| = n with an example.
ii. If ‘P’ ,’Q’ are sets and S is a universal set then P ∪ Q = S and P ∩ Q = ϕ are true and define the relation among sets P , Q and S

b) Find or prove the following with an example. Assume ‘P’,’Q’ are subsets of S , and S is a universal set then

1. If P – Q = Q – P then relation among P & Q are ?
2. P – {ε} = ?
3. P – Q = P ∩ Q’
4. $(P\ U\ Q)' = P' \cap Q'$
5. $(P\ U\ Q) = ?$</td>
<td>10
(5+5)</td>
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