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Daffodil International University

Department of Software Engineering

Faculty of Science & Information Technology

Midterm Examination, Fall 2023

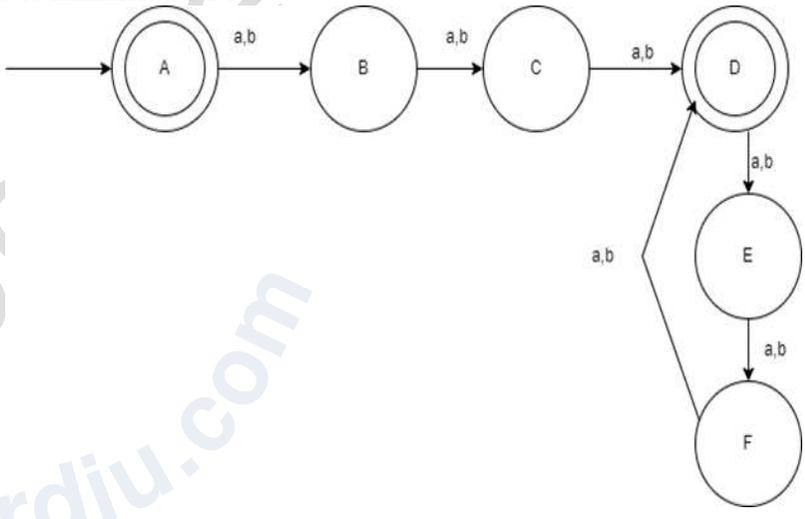
Course Code: SE234 ; Course Title: Theory of Computing

Sections & Teachers: All & FBR

Time: 1 Hour 30 Mins **Marks: 25**

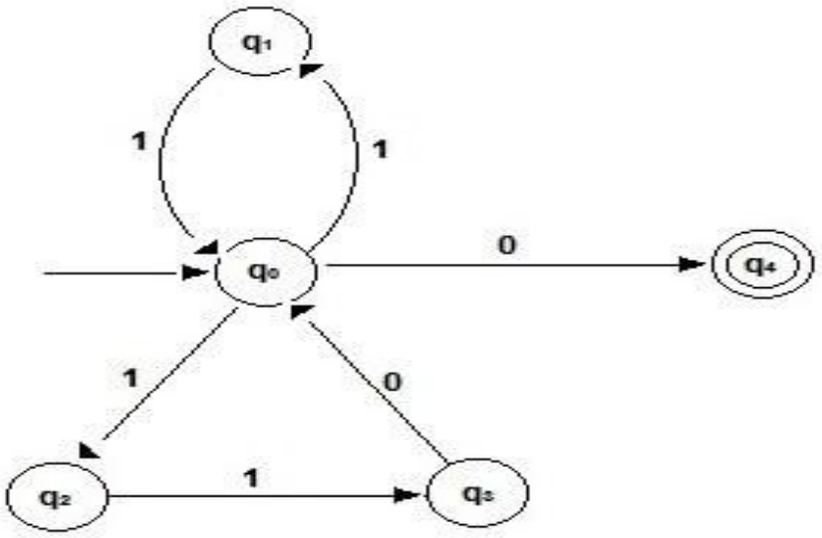
Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.	***a)***	Identify the system in the following case. Are they finite or context free? a) Automated ticket booking system b) Automated Door c) Self driving Car d) ChatGPT	**[Marks-2]**	**CLO-1** ***Level-4***
	b)	Let Σ = {a, b} and let L = { w ∈ Σ* | w ≠ ε and the first and last character of w are the same }. Design a DFA for L.	**[Marks-3]**	
	c)	Find out the Language for the following finite automata and make it minimal DFA. 	**[Marks-3]**	
	d)	Explain why not all NFAs are DFAs yet all DFAs are NFA.	**[Marks-2]**	

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2.	***a)***	**Outline the benefits and drawbacks of DFA and NFA in terms of implementation and design.**	**[Marks-3]**	**CLO-2** ***Level-4***
	b)	**Apply** "Subset construction" method to convert the following Non-Deterministic Finite Automata (NFA) to Deterministic Finite Automata (DFA)- Q= {q0, q1, q2. q3, q4} 	**[Marks-4]**	
	c)	**Construct** an NFA with ∑ = {0, 1} in which contain double '1' is followed by double '0'.	**[Marks-3]**	
3.	***a)***	Explain Regular Expression for "Password Validation" .	**[Marks-2]**	**CLO-3** ***Level-3***
	b)	**Construct** Regular Expression for the language of all strings over {a, b} such that the as and bs are strictly alternating. **Examples of strings in the language: ε, a, b, ab, ba, aba, bab, abab, baba** **Examples of strings not in the language: bb, aa, abba**	**[Marks-3]**	

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