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Daffodil International University

Department of Software Engineering

Faculty of Science & Information Technology

Midterm Examination, Fall 2024

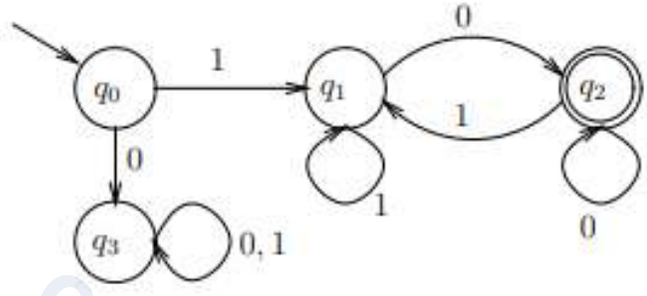
Course Code: SE234 ; Course Title: Theory of Computing

Sections & Teachers: All & FBR

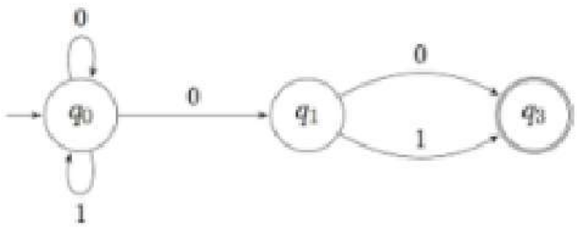
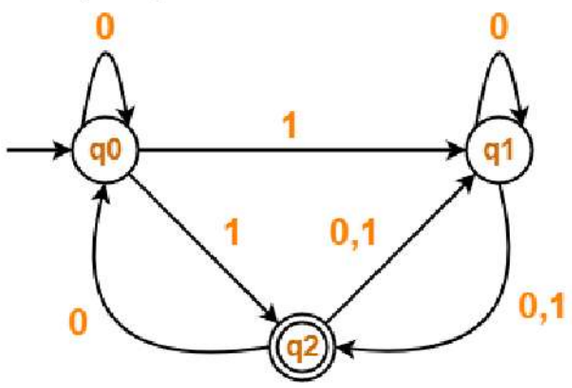
Time: 1 Hour 30 Mins **Marks: 25**

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* | the first and last character of w are not the same }. **Construct** a DFA for L.	**[Marks-3]**	
	c)	**Identify** the following finite automata by mentioning the significant difference between determinism and non-determinism. 	**[Marks-3]**	
	d)	**Choose** the method that is best suited for implementation from DFA and NFA, the two approaches to building finite automata, and provide an explanation.	**[Marks-2]**	
2.	***a)***	Use formal definition to precisely **identify** the following automata, and **demonstrate** computation for the string "0000.".	**[Marks-3]**	**CLO-2** ***Level-4***

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		 **Q = { q , q , q }**		
	b)	**Apply** "Subset construction" method to convert the following Non-Deterministic Finite Automata (NFA) to Deterministic Finite Automata (DFA)- 	**[Marks-4]**	
	c)	**Design** a non-deterministic finite automata for the following language of binary input L = {w : w contains three consecutive 111}	**[Marks-3]**	
3.	***a)***	**Explain** Regular Expression with examples .	**[Marks-3]**	**CLO-3** ***Level-3***
	b)	**Construct** Regular Expression for the language of all strings over {a, b} where: L = {ε , a , b, aa, ab, ba, bb}	**[Marks-2]**	