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Daffodil International University

Faculty of Science & Information Technology

Department of Software Engineering

Midterm Examination, Summer 2025

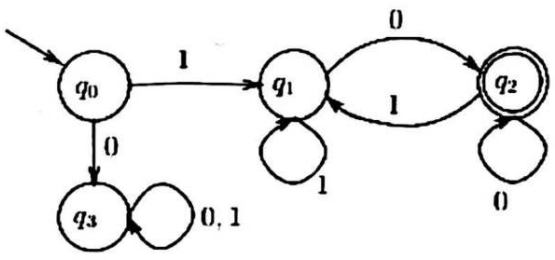
Course Code: SE234 ; Course Title: Theory of Computing

Sections & Teachers: FBR (A-D), FJT (E-H), NJN (I-J), ZNM (K-L), MMN (M), AMR (N)

Time: 1:30 Hrs **Marks: 25**

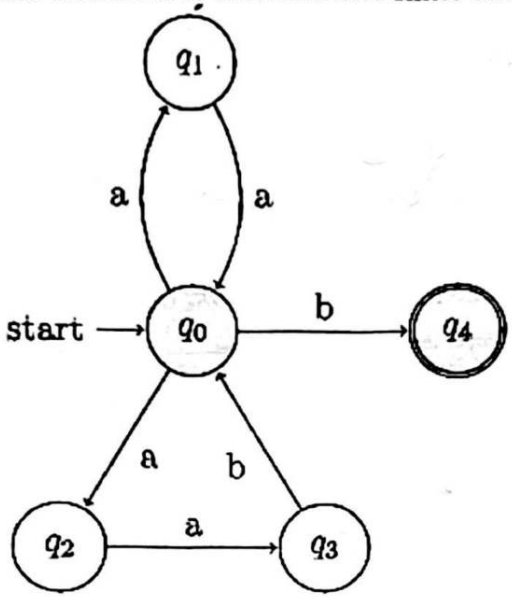
Answer ALL Questions

[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)***	Relate the type of system context free or Finite, applicable for each example: i) Spell checker in a text editor ii) Traffic Signal Controller iii) Simple Vending Machine iv) Chatbot	**[Marks-2]**	**CLO-1** *Level-3*
	b)	**Construct** DFA for the following Languages: **L = {w|w where each string starts and ends with the same symbol and length at least 2}.**	**[Marks-3]**	
	c)	**Illustrate** the differences between DFA and NFA in terms of: • State complexity • Transition rules • Suitability of Software implementation	**[Marks-2]**	
	d)	**Demonstrate** the following finite automata and show string acceptance for string 100110. 	**[Marks-3]**	
2.	***a)***	Construct a non-deterministic finite automata for the following language of input = {a,b} that accepts all strings where every 'a' is followed by at least two 'b'.	**[Marks-3]**	**CLO-2** *Level-3*

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	b)	**Apply** Subset-construction method to convert the following non-deterministic finite automata to deterministic finite automata-S  	**[Marks-4]**	
	c)	Explain with formal argument: Why is non-determinism considered a theoretical advantage but not a practical one when designing machines?	**3**	
3	*a)*	Construct a Regular Expression for the following Regular Language: {w | w contains single 1 for Binary input} Also mention four applications of regular expression.	**5**	**CLO-3** **Level-3**

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