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Daffodil International University

Faculty of Science & Information Technology

Department of Software Engineering

Midterm Examination, Spring 2026

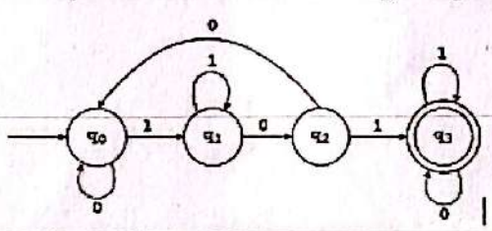
Course Code: SE234; Course Title: Theory of Computing

Sections & Teachers: FJT(A-D), TM(E), FBR (F-J)

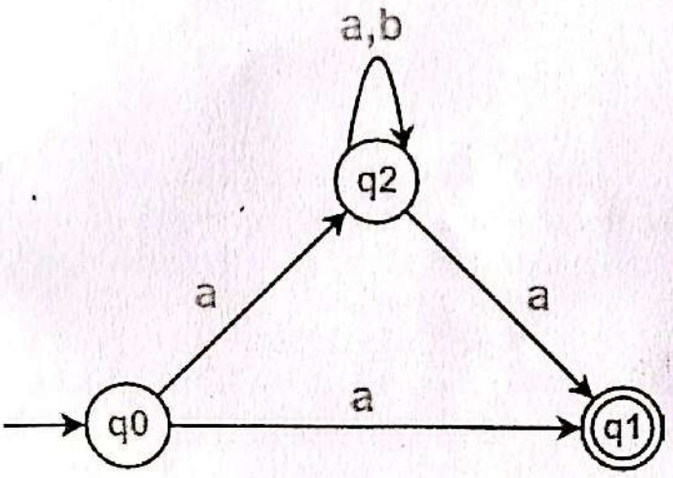
Time: 1 Hour 30 Mins **Marks: 25**

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)***	**Draw** both a DFA and an NFA for the given language L = { w ∈ {0,1} | w contains substring "10" } and Illustrate how non determinism in an NFA can reduce the number of states compared to an equivalent DFA by constructing both machines for a simple language.	**[Marks-3]**	**CLO-1** ***Level-3***
	b)	**Construct** state diagram of Deterministic finite Automata for language **i)** L = {w | w starts with 'a' and contains substring "bb" where input is {a,b}} **ii)** L = {w ∈ {0,1} | number of 0's is divisible by 3}	**[Marks-4]**	
	c)	**Demonstrate and identify** the following Finite Automata and show epsilon acceptation and **0110101** string acceptance. 	**[Marks-3]**	
2.	***a)***	**Illustrate** the advantages and disadvantages of Deterministic Finite Automata (DFA) and Non-Deterministic Finite Automata (NFA) in terms of **implementation, design, state complexity, memory usage.**	**[Marks-3]**	**CLO-2** ***Level-3***

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	b)	**Apply** subset construction method to convert the following Non-Deterministic Finite Automata (NFA) to Deterministic Finite Automata (DFA)-  	**[Marks-4]**	
	c)	**Construct** a Non deterministic finite automata where **L = {w| w strings having 3rd symbol 'a' from right end where Σ= {a,b,c}}**	**[Marks-3]**	
3.	*a)*	**Express** Regular Expression for the following Language: L= {w| w where each string should have three consecutive b's for input {b,c}} How regular expressions represent patterns in formal languages and evaluate their effectiveness by constructing one example and explaining how it captures the structure of the language?	**[Marks-5]**	**CLO-3** *Level-3*