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Daffodil International University

Faculty of Science & Information Technology

Department of Software Engineering

Midterm Examination, Spring 2025

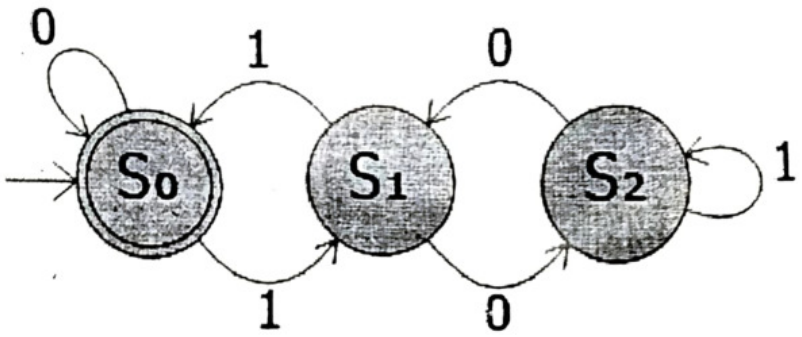
Course Code: SE234 ; Course Title: Theory of Computing

Sections & Teachers: FBR (A,B,C,D), FJT (E, F, G, H) , RJM (I)

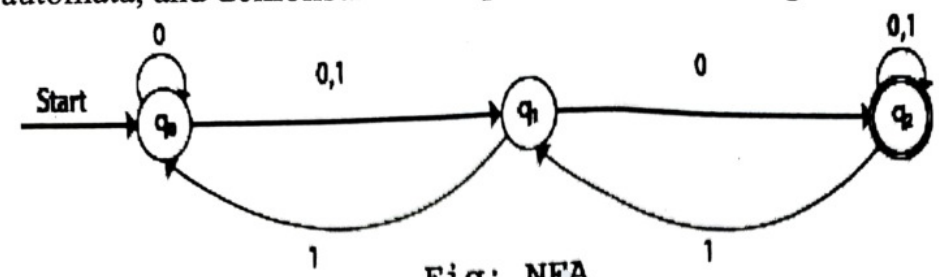
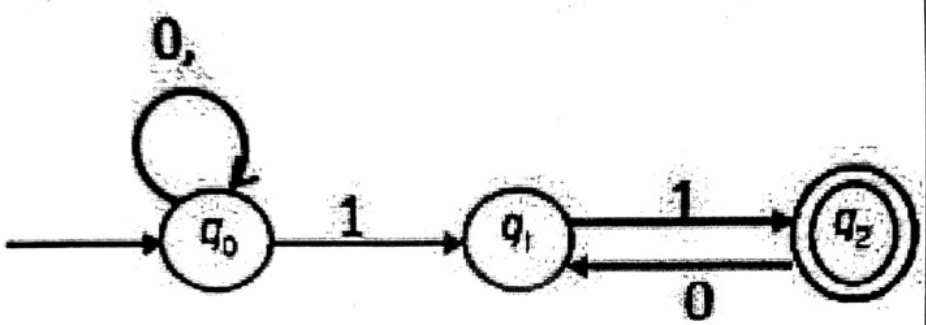
Time: 1 Hour 30 Mins **Marks: 25**

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 difference between ε and ϕ with a finite automata diagram. Compare and contrast the advantages and disadvantages of Deterministic Finite Automata (DFA) and Non-Deterministic Finite Automata (NFA) in terms of implementation and design.	**[Marks-3]**	**CLO-1** *Level-3*
	b)	**Construct** Deterministic finite Automata for following language: i) {w | every odd position of w is a 1 for binary alphabet} ii) Let Σ = {a, b} and let L = {ababa}. Design a DFA for L	**[Marks-4]**	
	c)	**Demonstrate** the following finite automata and identify it. Also show epsilon/ empty string acceptance for provided finite automata. 	**[Marks-3]**	

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2.	*a)*	Use formal definition to precisely **identify** the following automata, and **demonstrate** computation for the string "0000.".  Fig: NFA $Q = \{ q0 ; q1 , q2 \}$	[Marks-3]	CLO-2 *Level-3*
	b)	**Apply** "Subset construction" method to convert the following Non-Deterministic Finite Automata (NFA) to Deterministic Finite Automata (DFA)-  	[Marks-4]	
	c)	Sketch a non-deterministic finite automata which accept a string containing "the" anywhere in a string of {a-z}, e.g., "there" but not "those"	[Marks-3]	
3.	*a)*	Mention real life applications of Regular expression	[Marks-2]	CLO-3 *Level-3*
	b)	**Construct** Regular Expression for the following Language: L= {w| w does contain 3 consecutive b's where alphabet in {b, d}}	[Marks-3]	