



Daffodil International University
Faculty of Science & Information Technology
Department of Software Engineering
Midterm Examination, Spring 2025

Course Code: SE234 ; Course Title: Theory of Computing

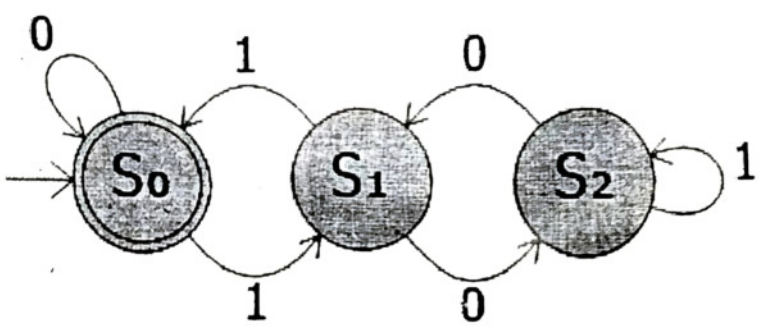
Sections & Teachers: FBR (A,B,C,D), FJT (E, F, G, H) , RJM (I)

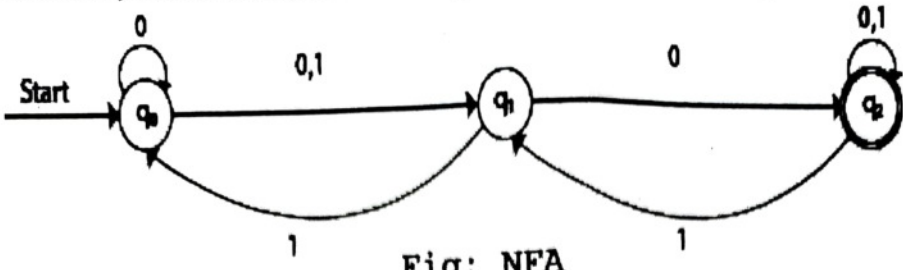
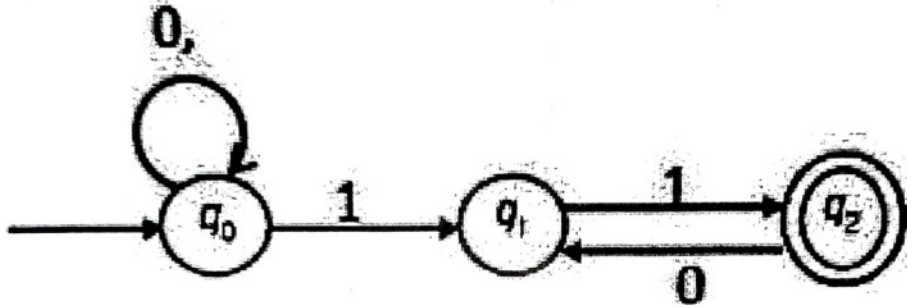
Time: 1 Hour 30 Mins

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) $\{w \mid \text{every odd position of } w \text{ is a } 1 \text{ for binary alphabet}\}$ ii) Let $\Sigma = \{a, b\}$ 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]	

2.	<p>a) Use formal definition to precisely identify the following automata, and demonstrate computation for the string "0000".</p>  <p style="text-align: center;">Fig: NFA</p> <p style="text-align: center;">$Q = \{ q_0, q_1, q_2 \}$</p>	[Marks-3]	CLO-2 Level-3
	<p>b) Apply "Subset construction" method to convert the following Non-Deterministic Finite Automata (NFA) to Deterministic Finite Automata (DFA)-</p> 	[Marks-4]	
	<p>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"</p>	[Marks-3]	
3.	<p>a) Mention real life applications of Regular expression</p>	[Marks-2]	CLO-3 Level-3
	<p>b) Construct Regular Expression for the following Language: $L = \{ w \mid w \text{ does contain 3 consecutive b's where alphabet in } \{b, d\} \}$</p>	[Marks-3]	