



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

Course Code: SE234 ; Course Title: Theory of Computing

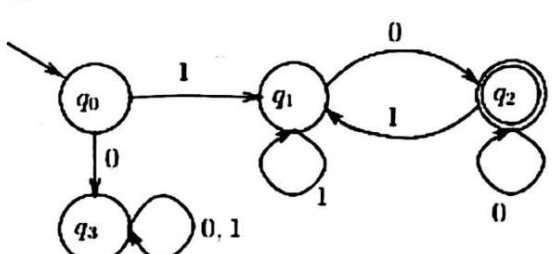
Sections & Teachers: FBR (A-D), FJT (E-H), NJN (I-J), ZNM (K-L), MMN (M), AMR (N)

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: $L = \{w w \text{ where each string starts and ends with the same symbol and length at least } 2\}.$	[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

	b)	Apply Subset-construction method to convert the following non-deterministic finite automata to deterministic finite automata-S <pre>graph TD; start((start)) --> q0((q0)); q0 -- a --> q1((q1)); q1 -- a --> q0; q0 -- b --> q4(((q4))); q0 -- a --> q2((q2)); q2 -- a --> q3((q3)); q3 -- b --> q0;</pre>	[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