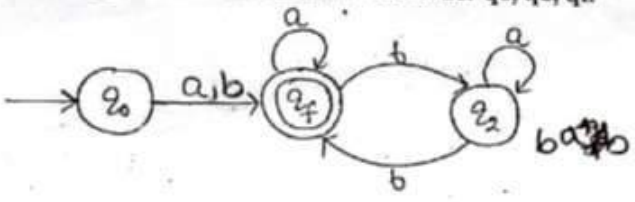
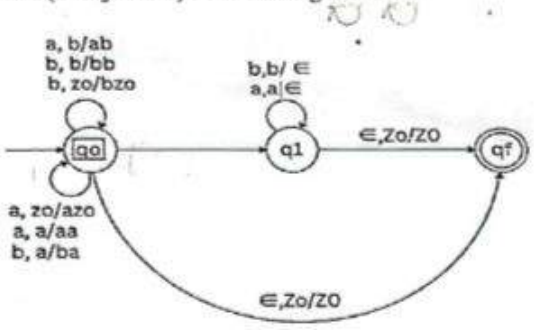
Daffodil International University
Faculty of Science & Information Technology
Department of Software Engineering
Final Examination, Summer 2025
Course Code: SE234; Course Title: Theory of Computing
Sections & Teachers: FBR (A-D), FJT (E-H), NJN (I-J), ZNM (K-L), MMN (M), AMR (N)
Time: 2:00 Hrs **Marks: 40**

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)	Construct a **Parse Tree** (showing **LMD**) for the string abbababa using the CFG: aabababb $S \rightarrow aSb \mid bSa \mid ab.$	[Marks-3]	CLO-3 *Level-3*
	b)	**Apply** state elimination method to discover the Regular expression from the following DFA **To remove follow the order q0, q2, qf.** 	[Marks-5]	
	c)	**L1:** Construct the regular expression for the language over {0,1} such that no two 1's occur consecutively. **L2:** Construct a regular expression for the language consisting of one or more 0's followed by zero or more 1's followed by one or more 0's.	[Marks-5]	
	d)	**Illustrate** a Non deterministic finite automata for the following regular expression by using the Lemma method. $(ab^* + ba^*)^*a$	[Marks-4]	

	e)	i) Construct a **Context Free Grammar (CFG)** for the language: $\{w \mid w$ **contains equal number of 0's and 1's**$\}$ ii) Construct a CFG for the language: $$L(G) = \{a^n b^{2n} c^m d^k \mid n \geq 1, m > 1, k \geq 0\}$$	[Marks-5]	
	f)	**Apply** the concept of grammar ambiguity to determine whether the given grammar is ambiguous or not. $S \rightarrow A \mid B$ $A \rightarrow aAb \mid ab$ $B \rightarrow abB \mid \epsilon$	[Marks-4]	
	g)	**Construct** a Push down Automata for the following language: $$L = \{a^n b^n c^m \mid n, m \geq 1\}.$$	[Marks-4]	
	h)	**Demonstrate** the following Push down automata and **illustrate** the acceptance (or rejection) of the string **abaaba**. 	[Marks-5]	
2.	a)	**Compare** the expressive power of **Finite State Machine (FSM), Context Free Language (CFL),** and **Turing Machine (TM)** with suitable examples for each. **Also Show** a Turing Machine over binary alphabet for L ={w|w ends with 101}	[Marks-5]	CLO-4 *Level-2*