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Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science & Engineering

Mid Term Examination, Spring 2025

Course Code: CSE228, Course Title: Theory of Computation

Level: L2 Term: T2 Batch: 65

Time: 01.5 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.]

Q1	**a)**	**Summarize** the difference between $\sum^*$ and $\sum^+$ with an example. Given L={a, bc}, so compute L^*	**[2]**	**CO1**
	b)	**Identify** which language represent by the following transition table as well as **Evaluate** the string 00110 using extended transition function.	**[2]**	
	c)	**Summarize** the meaning of (a+b) (a+b)a(a+b)*	**[1]**	
Q2	**a)**	**Apply** the knowledge of NFA to Design NFA's accepting the following languages I. To recognize the following sets of strings: CSE228, BATCH65, SPRING2025. where ∑={0,1,2…9,A,B,C…Z} II. To accept the set of strings that end with ba, bb and baa. where ∑={a,b}	**[3]**	**CO2**
	b)	**Apply** the knowledge of DFA to design **DFAs** to **i)** Verify student IDs in the range **232-15-001 to 232-15-981** for the students of **CSE Batch 65 at DIU**, ensuring automated validation and error prevention in the university's system. **ii)** Recognizes binary strings **ending with "101"**	**[3] + [1]**	
	c)	Design a NFA for the binary strings that end with 10. After designing NFA, **convert that** to DFA.	**[3]**	
Q3	**a)**	**Construct** a **Regular Expression (RE)** for the language consisting of all binary strings (0s and 1s) that satisfy the following conditions: i) Start with **10** and contain **011** anywhere in the string. ii) Have **exactly two consecutive 1s** in any position. iii) End with **00 or 11**.	**[3]**	**CO2**
	b)	**Draw** ∈ NFA for the following **RE:** **i. (0+1)*1(0+1)** **ii.((ba*)*+abb**	**[3]**	
	c)	**Convert** the following DFA into equivalent RE by state elimination approach	**[4]**	

	0	1
→ q0	q0	q1
q1	q2	q1
*q2	q0	q1

