



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 Σ^* and Σ^+ 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. <table><tr><td></td><td>0</td><td>1</td></tr><tr><td>→ q0</td><td>q0</td><td>q1</td></tr><tr><td>q1</td><td>q2</td><td>q1</td></tr><tr><td>*q2</td><td>q0</td><td>q1</td></tr></table>			0	1	→ q0	q0	q1	q1	q2	q1	*q2	q0	q1	[2]
		0	1													
→ q0	q0	q1														
q1	q2	q1														
*q2	q0	q1														
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 $\Sigma=\{0,1,2\dots9,A,B,C\dots Z\}$ II. To accept the set of strings that end with ba, bb and baa. where $\Sigma=\{a,b\}$	[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 ϵ 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 <pre>graph LR q0((q0)) -- 1 --> q0 q0 -- 0 --> q1((q1)) q1 -- 0 --> q2((q2)) q2 -- 0 --> q3(((q3))) q3 -- "0, 1" --> q3 q1 -- 1 --> q3</pre>	[4]													