



Daffodil International University
Faculty of Science & Information Technology
Department of Computer Science & Engineering
Mid term Examination, Fall 2025
Course Code: CSE228, Course Title: Theory of Computation
Level: L2 Term: T2 Batch: 66

Time: 01.5 Hrs

Marks:25

Answer ALL Questions

[All portions of each question must be answered sequentially.]

Q1	a)	Summarize the difference between Σ^* and Σ^+ . Let the Alphabet $\Sigma=\{a, b, c\}$, so compute Σ^2	[2]	CO1													
	b)	Evaluate the string <u>1001101</u> using the extended transition function for the following transition table. <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>0</th> <th>1</th> </tr> </thead> <tbody> <tr> <td>→ q0</td> <td>{q0}</td> <td>{q0, q1}</td> </tr> <tr> <td>q1</td> <td>{q2}</td> <td>∅</td> </tr> <tr> <td>q2</td> <td>∅</td> <td>{q3}</td> </tr> <tr> <td>*q3</td> <td>∅</td> <td>∅</td> </tr> </tbody> </table>			0	1	→ q0	{q0}	{q0, q1}	q1	{q2}	∅	q2	∅	{q3}	*q3	∅
	0	1															
→ q0	{q0}	{q0, q1}															
q1	{q2}	∅															
q2	∅	{q3}															
*q3	∅	∅															
Q2	a)	Apply the knowledge of NFA to Design NFA's accepting the following words: Batch66, CSE228, Dept, CSE, TOC	[3]	CO2													
	b)	Apply the knowledge of DFA to Design DFA's for the following: <div style="margin-left: 20px;"> i) Design a DFA that recognizes valid product identifiers formatted as <u>PRD-2XX</u> (where XX ranges from <u>01-99</u>), ensuring automated validation and rejection of invalid codes within an inventory management system. </div>	[4]														
		<div style="margin-left: 20px;"> ii) The set of strings containing <u>010 at the end</u> in the string over alphabet {0,1} </div>															
		<div style="margin-left: 20px;"> iii) Language $L=\{W/ W \text{ has odd number of 1's and odd number of 0's}\}$ over alphabet {0,1} </div>															
	c)	Apply the knowledge of conversion of NFA to DFA, convert the NFA given in Q1 b, to DFA	[3]														
Q3	a)	Construct the Regular Expression for the languages <div style="margin-left: 20px;"> i) Containing aba or bab anywhere in the string over the alphabet {a,b} ii) Containing d either two or three possible positions from the beginning over the alphabet {b,d}. iii) Containing 101 or 010 at the end of the string over the alphabet {0,1} </div>	[3]	CO2													
	b)	Convert the following Regular expression (RE) into NFA with ϵ transition. <div style="margin-left: 20px;"> i. $(a b)^*(ab a^*b)$ ii. $(ba^*)^*+bab$ </div>	[3]														
	c)	Using the State elimination approach, Convert the given NFA into its corresponding Regular Expression. <div style="text-align: center; margin-top: 10px;"> </div>	[4]														