



**Daffodil International University**  
**Faculty of Science & Information Technology**  
**Department of Computer Science & Engineering**  
 Mid Semester Examination, Fall 2024  
 Course Code: CSE228, Course Title: Theory of Computation  
 Level: L2 Term: T2 Batch: 64

Time: 01.5 Hrs

Marks:25

**Answer ALL Questions**

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

<b>Q1</b>	a)	Summarize the difference between $\emptyset$ and $\epsilon$ . Given the Alphabet $\Sigma = \{y, z, 0\}$ , so compute $\Sigma^2$	<b>[2]</b>	<b>CO1</b>												
	b)	Evaluate the string 00110 using extended transition function for the following transition table.  <div style="text-align: center; margin: 10px 0;"> <table style="border-collapse: collapse; margin: auto;"> <tr> <td style="border-right: 1px solid black; padding: 5px;"></td> <td style="padding: 5px; text-align: center;">0</td> <td style="padding: 5px; text-align: center;">1</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px; text-align: right;">→ q0</td> <td style="padding: 5px;">{q0}</td> <td style="padding: 5px;">{q0,q1}</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px; text-align: right;">q1</td> <td style="padding: 5px;">{q2}</td> <td style="padding: 5px;">∅</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px; text-align: right;">*q2</td> <td style="padding: 5px;">∅</td> <td style="padding: 5px;">∅</td> </tr> </table> </div>			0	1	→ q0	{q0}	{q0,q1}	q1	{q2}	∅	*q2	∅	∅	<b>[2]</b>
		0	1													
→ q0	{q0}	{q0,q1}														
q1	{q2}	∅														
*q2	∅	∅														
c)	Summarize the meaning of “a*b+b*a”.	<b>[1]</b>														
<b>Q2</b>	a)	Apply the knowledge of NFA to Design NFA's accepting the following languages over the alphabet {a,b} i) The set of all Strings containing <b>aba</b> anywhere in the string ii) The set of all Strings ending with <b>bba</b> iii) ending with <b>bbb</b>	<b>[3]</b>	<b>CO2</b>												
	b)	Apply the knowledge of DFA to Design DFA's accepting the following languages over the alphabet {0,1} i) The set of strings containing 010 at the end in the string ii) Design DFA to accept the following language, $L = \{W / W \text{ has odd number of 1's and even number of 0's}\}$	<b>[3]</b>													
	c)	Considering the transition table from the Q1 b. If the mentioned Automata is NFA, then convert to DFA.	<b>[4]</b>													
<b>Q3</b>	a)	Construct the Regular Expression for the language consisting of all the strings of 0' and 1's that have the following condition: i) Containing 110 anywhere in the string ii) Containing 1 either two or three possible position from the beginning. iii) Containing 101 at the end of the string	<b>[3]</b>	<b>CO2</b>												
	b)	Convert the following Regular expression (RE) into NFA with $\epsilon$ transition. i) $1(1+0)^*0$ ii) $(a b)^*(abb a^*b)$	<b>[3]</b>													
	c)	Convert the following NFA into equivalent RE	<b>[4]</b>													

