



**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.]*

Q1	a)	Summarize the difference between $\emptyset$ and $\epsilon$ . Given the Alphabet $\Sigma = \{y, z, 0\}$ , so compute $\Sigma^2$	[2]	CO1												
	b)	Evaluate the string 00110 using extended transition function for the following transition table. <div style="text-align: center;"> <table border="1"> <tr> <td></td> <td>0</td> <td>1</td> </tr> <tr> <td>→ q0</td> <td>{q0}</td> <td>{q0,q1}</td> </tr> <tr> <td>q1</td> <td>{q2}</td> <td><math>\emptyset</math></td> </tr> <tr> <td>*q2</td> <td><math>\emptyset</math></td> <td><math>\emptyset</math></td> </tr> </table> </div>			0	1	→ q0	{q0}	{q0,q1}	q1	{q2}	$\emptyset$	*q2	$\emptyset$	$\emptyset$	[2]
		0	1													
→ q0	{q0}	{q0,q1}														
q1	{q2}	$\emptyset$														
*q2	$\emptyset$	$\emptyset$														
c)	Summarize the meaning of "a*b+b*a".	[1]														
Q2	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 aba anywhere in the string ii) The set of all Strings ending with bba iii) ending with bbb	[3]	CO2												
	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, $L = \{W / W \text{ has odd number of 1's and even number of 0's}\}$	[3]													
	c)	Considering the transition table from the Q1 b. If the mentioned Automata is NFA, then convert to DFA.	[4]													
Q3	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	[3]	CO2												
	b)	Convert the following Regular expression (RE) into NFA with $\epsilon$ transition. i) $1(1+0)^*0$ ii) $(a b)^*(abb a^*b)$	[3]													
	c)	Convert the following NFA into equivalent RE <div style="text-align: center;"> </div>	[4]													