



United International University (UIU)
Dept. of Computer Science & Engineering (CSE)

Mid Exam Fall 2023

CSE 2233/CSI 233: Theory of Computation/Theory of Computing

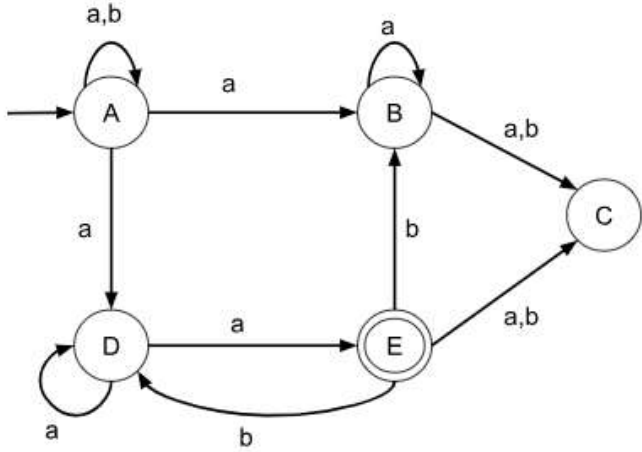
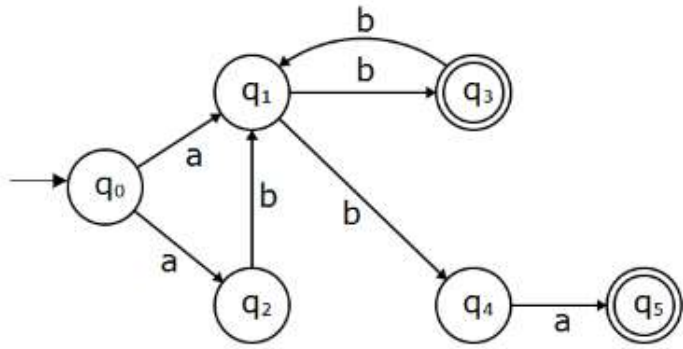
Total Marks: 30

Duration: 1 Hour 45 Minutes

Answer all questions. Figures in the right-hand margin indicate full marks.

Any examinee found adopting unfair means will be expelled from the trimester/program as per UIU disciplinary rules.

1.	Design DFAs that accept the following languages: a) L = accepts any string that has an even number of 'a' or odd number of 'b' over alphabet {a, b} b) L = accepts any string which starts with an odd number of 'r' and ends with 'brb' over the alphabet {b, r} c) L = accepts any string where the last two symbols are different over the alphabet {a, b}	3 x 3
2.	Design NFAs that accept the following languages: a) $L = \{w \mid w \text{ starts with 'a' or 'b' and contains 'cca' and ends with 'b' or 'c'} \mid \Sigma = \{a, b, c\}$ b) $L = \{w \mid w \text{ starts and ends with different symbols with a total length of at least 2} \mid \Sigma = \{0, 1\}$ c) $L = \{w \mid w \text{ contains 'xyz' or 'yzx' or 'zxx' and ends with 'yz'} \mid \Sigma = \{x, y, z\}$	3 x 3

3.	<p>Consider the following NFA, and show with the help of NFA-tree whether the string “aababa” is accepted.</p> 	3
4.	<p>Convert the following NFA over the alphabet $\Sigma = \{0, 1\}$ to an equivalent DFA.</p> 	4
5.	<p>a) Convert the following regular expressions to finite automata:</p> <ol style="list-style-type: none"> $(ab)^* + (a + ab)^* b^* (a + b)^*$ $[a + ba(a + b)]^* a (ba)^* b^*$ <p>b) Convert the following languages to their corresponding regular expression:</p> <ol style="list-style-type: none"> $L = \{\text{strings such that the 4th symbol from the right is b over the alphabet } \{a, b\}\}$ $L = \{\text{strings such that they start and end with 'a' over the alphabet } \{a, b, c\}\}$ 	<p>1.5 x 2</p> <p>1 x 2</p>