United International University (UIU)

Dept. of Computer Science & Engineering (CSE)

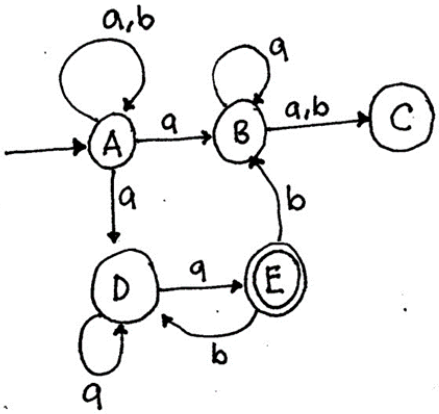
Mid Exam Spring 2023

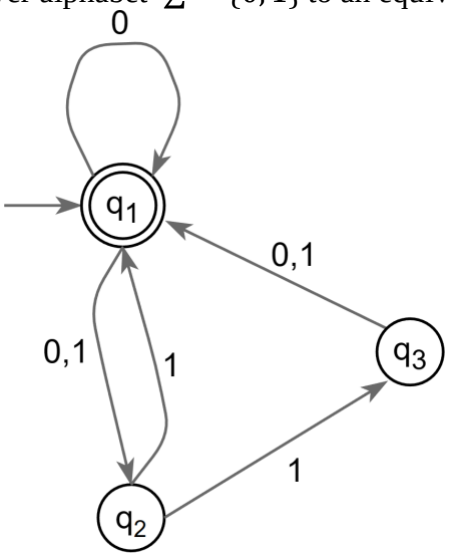
CSE 2233/CSI 233: Theory of Computation/Theory of Computing

Total Marks: **30** Duration: 105 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 accepts the following languages: **a)** L= contains even number of 'a' and ends with 'bc' | ∑ = {a, b, c} **b)** L = does not contain 'mnm' | ∑ = {m,n,w} **c)** L = starts with 'gh' and contains 'kgh' and ends with 'gh' | ∑ = {g,h,k}	3 x 3
2.	Design NFAs that accepts the following languages: **a)** L= starts with 'p', and contains 'rqp', and ends with 'qr' | ∑ = {p,q,r} **b)** L= starts with '11' or '21', and contains '210', and ends with '101' | ∑ = {0,1,2} **c)** L =starts with 'xyz' *and* contains 'yyz' or 'zyx' *and* ends with 'zy' | ∑ = {x, y, z}	3 x 3
3.	Consider the following NFA, and show with the help of NFA-tree whether the string "aabaa" is accepted or not. 	3

4.	Convert the following **NFA** over alphabet $\sum = \{0, 1\}$ to an equivalent **DFA**.  	6
5.	Design Regular Expression for the following languages where $\sum = \{a, b\}$: a. All strings *w* having even length strings and starting with ***a*** or odd length strings starting with ***b.*** b. All strings *w* which begins and ends with ***b.*** c. All strings *w* where every ***a*** is followed by at least one ***b.***	3