



United International University (UIU)

Dept. of Computer Science & Engineering (CSE)

Midterm Exam : Trimester: Summer 2020

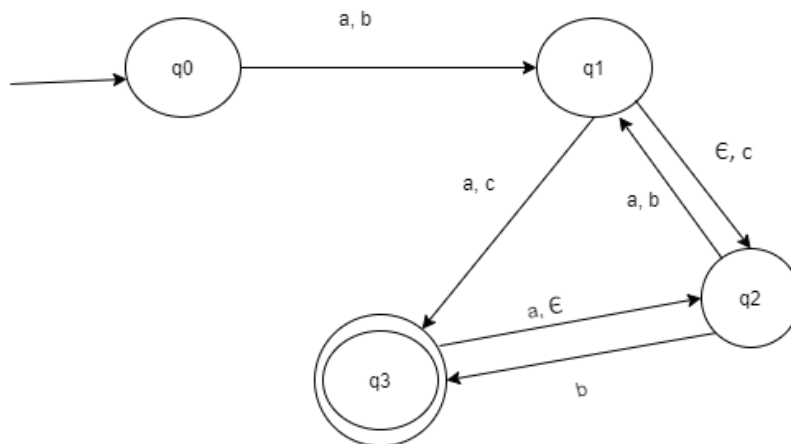
Course Code: CSI 233/CSE 2233, Course Title: Theory of Computing

Total Marks: 20

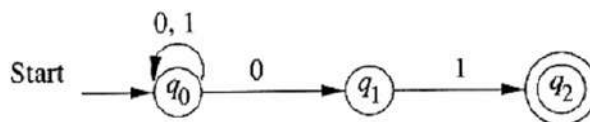
Duration: 1 hour

There are 4 questions. Answer all questions. Any examinee found adopting any unfair means will be expelled from the trimester/program as per UIU disciplinary rules.

- Design the state diagram of a DFA that accepts only strings of 0 and 1 that starts with 1 and contains at most (maximum) three 0's. [Sample Accepted Strings: 1, 110, 101, 1100101] [CO2] [3]
 - Design the state diagram of a DFA that accepts only strings of 0 and 1 that does not contain 1011 as a substring. [CO2] [3]
- Draw the state diagram of a NFA/ ϵ -NFA over alphabet set $\{a, b, c\}$ that starts with ab and ends with cc. [Sample Accepted Strings: abcbcc, abcbabbcc, abbaacc] [CO2] [2]
 - Draw the state diagram of a NFA/ ϵ -NFA over alphabet set $\{0,1\}$ that contains 011 or 1101 as a substring. [CO2] [2]
- Convert the following ϵ -NFA over alphabet $\{a, b, c\}$ to an equivalent DFA. Draw the state diagram of the DFA. [CO1] [3]



- Consider the following NFA, and show with the help of NFA-tree whether the string '110010' is accepted or not. [CO1] [3]



4. Write down Regular Expressions for the following languages.

(a) Strings of alphabet $\{a, b, c\}$ which contains ab and ac as substrings. [CO2] [2]

(b) Strings of alphabet $\{0, 1, 2, \dots, 9\}$ which contains the odd years of 20th century. [2]
Sample Accepted Strings: 2001, 2999, 2301. [CO2]