



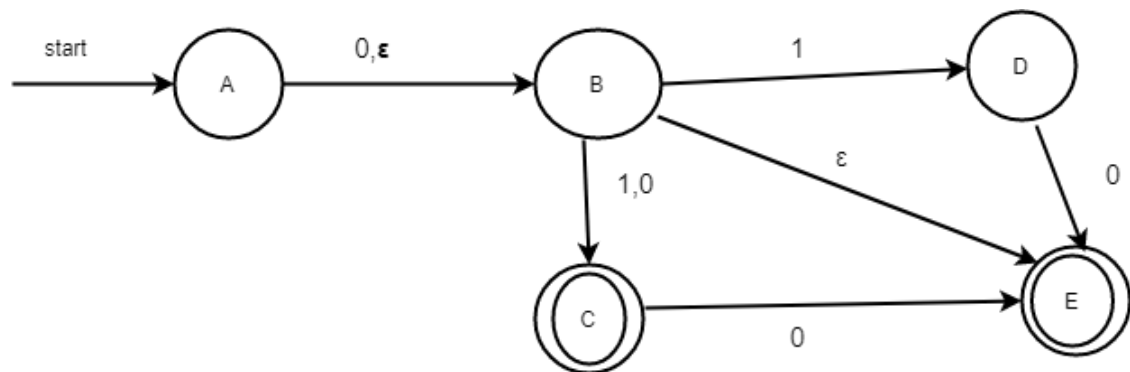
United International University

Department of Computer Science and Engineering

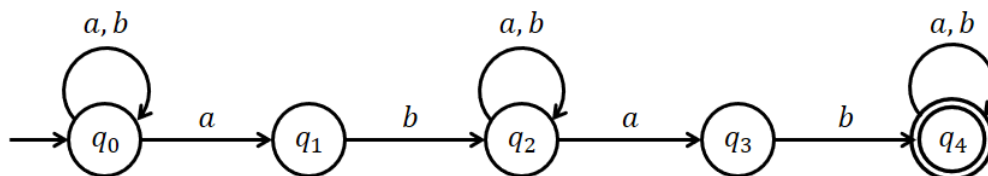
CSI 233/CSE 2233: Theory of Computing
Mid-term Examination : Summer 2019
Total Marks: 30 Time: 1 hour and 45 minutes

Answer all 5 questions. Numbers to the right of the questions denote their marks.

- Design a **DFA** that accepts all and only the strings of a , b and c which contain even number of a 's or odd number of b 's. Show the five components of the automaton. 2+2=4
 - Design a **DFA** that accepts all and only the strings of 0 and 1 which contain 0010 as a substring. 2
- Draw the state diagram of an **NFA**/ ϵ -**NFA** which accepts strings of length at most 5. The set of accepted symbols is $\{0, 1, 2\}$. 2
 - Draw the state diagram of an **NFA**/ ϵ -**NFA** for alphabet set $\{a, b, c\}$ which starts with abc or ends with bb . 2
 - Draw the state diagram of an **NFA**/ ϵ -**NFA** which accepts those binary strings that has odd decimal values. The set of accepted symbols is $\{0, 1\}$. 2
- Write down **regular expressions** for the following languages: 2+2=4
 - Strings of alphabet $\{a, b, c\}$ with odd number of a 's followed by even number of b 's.
 - Student ID of BSCSE students of UIU from Spring 2017 till Spring 2019. Assume that UIU has only 300 students admitted in each trimester. Sample accepted strings: 011171001, 011182135, 011191300.
 - Design an ϵ -**NFA** that accepts the strings defined by the following regular expression: 2
 $(ab^* + b + c)^*(c^* + b^* + \epsilon)$
- Look at the following ϵ -NFA, and answer the questions that follow.



- Write down the ϵ -closure for each state. 2
 - Convert this ϵ -NFA to an equivalent **DFA**. Show the state diagram and transition table. 2+2=4
5. Look at the following NFA, and answer the questions that follow.



- Find out if the following strings are accepted by the NFA. Show input process for your answers. 2+2=4
 - $abbaaccb$
 - $bbabacab$
- Describe the language of the automaton. 2