Department of Computer Science and Engineering
University of Liberal Arts Bangladesh
Mid-Term Examination (Summer 2020)
Course: Automata and Theory of Computation (CSE 417)
Section: 2 --- Duration: 1 Hour

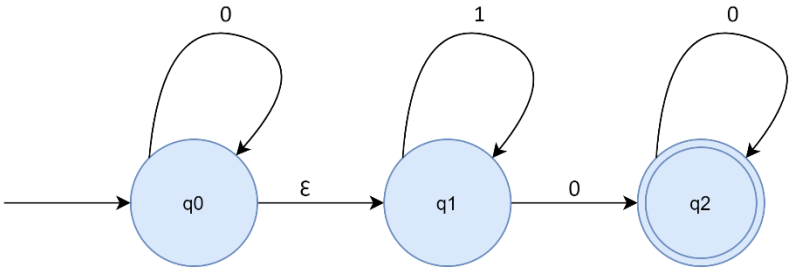
PLEASE ANSWER ALL QUESTIONS. **Total 25 Marks**

QUESTION 1

What are the 5-tuples of a DFA?
What is the difference between the formal definitions of DFA, NFA and ε-NFA? Explain with a suitable example. **(2+3=5 Marks)**

QUESTION 2

Consider the following ε-NFA:



Convert the ε-NFA to its equivalent NFA.
What will be the output for inputs "000" and "111"? **(3+2=5 Marks)**

QUESTION 3

Define the transition function, δ for an NFA.
"All DFAs are by definition an NFA"- Explain
Suppose you are trying to develop a game where the user starts from the center (0,0) of a standard cartesian coordinate system. The user can either move up (denoted by U/↑) or he can move right (denoted by R/→). Assume the user wins the game if s/he reaches (2,1). Design the NFA that can determine if the user wins the game. Provide, Q, Σ, q0, and F. **(1+2+4=7 Marks)**

QUESTION 4

Prepare the state transition table for the NFA you designed. Convert it to its equivalent DFA.
How would you convert a DFA to its equivalent NFA?
Is it possible for a DFA to have more than one final state? **(5+2+1=8 Marks)**

****END OF QUESTIONS****