



বাংলাদেশ আর্মি ইন্টারন্যাশনাল ইউনিভার্সিটি অব সায়েন্স এন্ড টেকনোলজি, কুমিল্লা  
 BANGLADESH ARMY INTERNATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY (BAIUST), CUMILLA

**Mid Term Examination, Spring 2025**

Department of Computer Science and Engineering

Level-3 Term-I

Course Code: CSE-319

Course Title: Theory of Computations

Credit Hour: 03

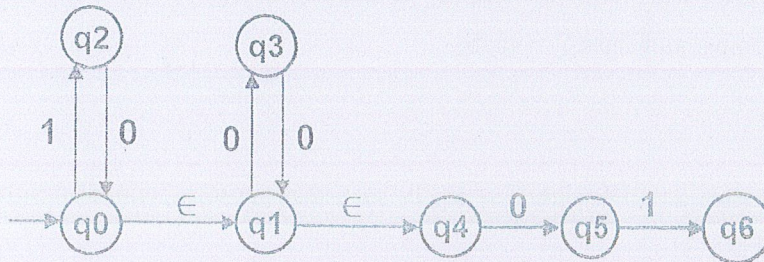
Exam Duration: 1 Hour 30 Minutes

Full Marks: 90

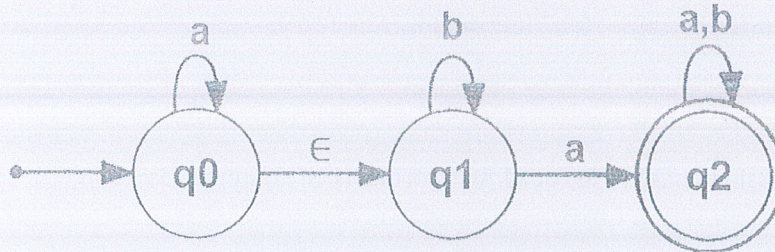
**Notes:**

- a. Figure on the right of each question indicates the marks for the respective question.
- b. Answer all the **THREE** questions.
- c. Course Learning Outcomes are
  - CO1: Identify the mathematical foundations of computation including automata theory.
  - CO2: Able to define the foundation of the theory of formal languages, grammars, notions of algorithm, decidability, complexity, and computability.
  - CO3: Correlate and design finite automata, pushdown automata, Turing machines, formal languages, and grammars.
  - CO4: Enhance one's ability to explain and conduct mathematical proofs for computation and algorithms.

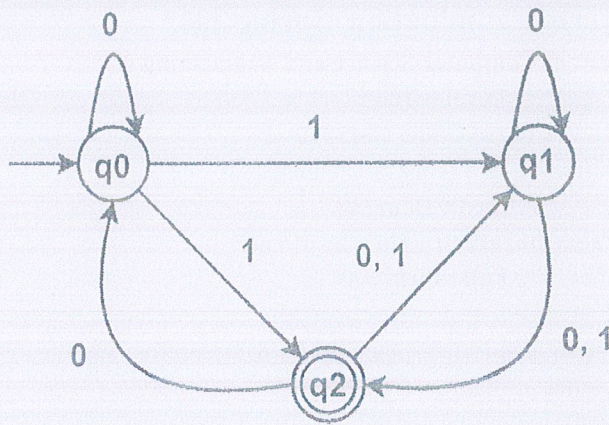
1. a. Consider the following epsilon NFA to NFA [CO2→C3] [15]



- b. Convert the given  $\epsilon$ -NFA into its equivalent DFA [CO2→C4] [15]



2. a. Convert the following Non-Deterministic Finite Automata (NFA) to Deterministic Finite Automata (DFA). [CO2→C4] [15]



- b. Construct an NFA that ends with 01 and convert this NFA to its corresponding DFA. [CO2→C4] [15]
3. a. Answer any **one** question only from this: [CO3→C3] [15]
- Construct a DFA for the language accepting strings ending with 'abba' over input alphabets  $\Sigma = \{a, b\}$

OR

- Construct an NFA with  $\Sigma = \{0, 1\}$  such that the third symbol from the right is "1".
- b. Answer any **one** question only from this: [CO3→C3] [15]
- Construct an NFA with  $\Sigma = \{a, b, c, \epsilon\}$  where strings contain some "a's" followed by some "b's" followed by some "c's".

OR

- Explain the use of the dead State in theory of computation.