

Course Code: CS3005	Course Name: Theory of Automata
Instructor Name: Mr. Musawar Ali, Ms. Bakhtawar Abbasi	
Student Roll No:	

Instructions:

- Return the question paper.
- Attempting of the question in the given order is highly encouraged.
- Read each question completely before answering it. There are **4 questions on 2 pages**.
- In case of any ambiguity, you may make assumption. But your assumption should not contradict any statement in the question paper.

Time: 60 minutes.

Max Marks: 40 points

Question 1: Deterministic Finite Automata

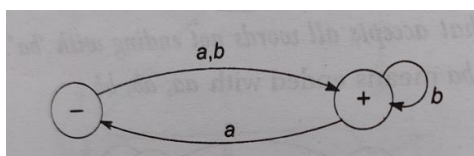
(4+4) Points

- Design the DFA for Regular Expression $(\lambda + b)(ab)^*(\lambda + a)$. Defined over alphabet $\Sigma = \{a, b\}$, also define language.
- Design the DFA for Regular Expression $ab(ab)^*ba(ba)^*$ or $ba(ba)^*ab(ab)^*$. Defined over alphabet $\Sigma = \{a, b\}$, also define language.

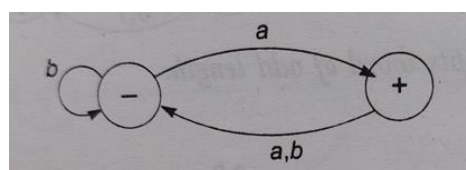
Question 2: Regular Expressions

(3+3+5) Points

- The set of all string over $\Sigma = \{0, 1\}$, having at most one pair of 0's or at most one pair of 1's. Some of the strings in the given language are: $\{00, 11, 00111, 00011, 0011, \dots\}$
- Find a regular expression for the language $L = \{w \mid w \in \{0,1\}^* : w \text{ has no pair of consecutive one's}\}$. Defined over alphabet $\Sigma = \{0,1\}$
- Find a regular expression for the given DFAs.



DFA1



DFA2

Question 3: Non- Deterministic Finite Automata

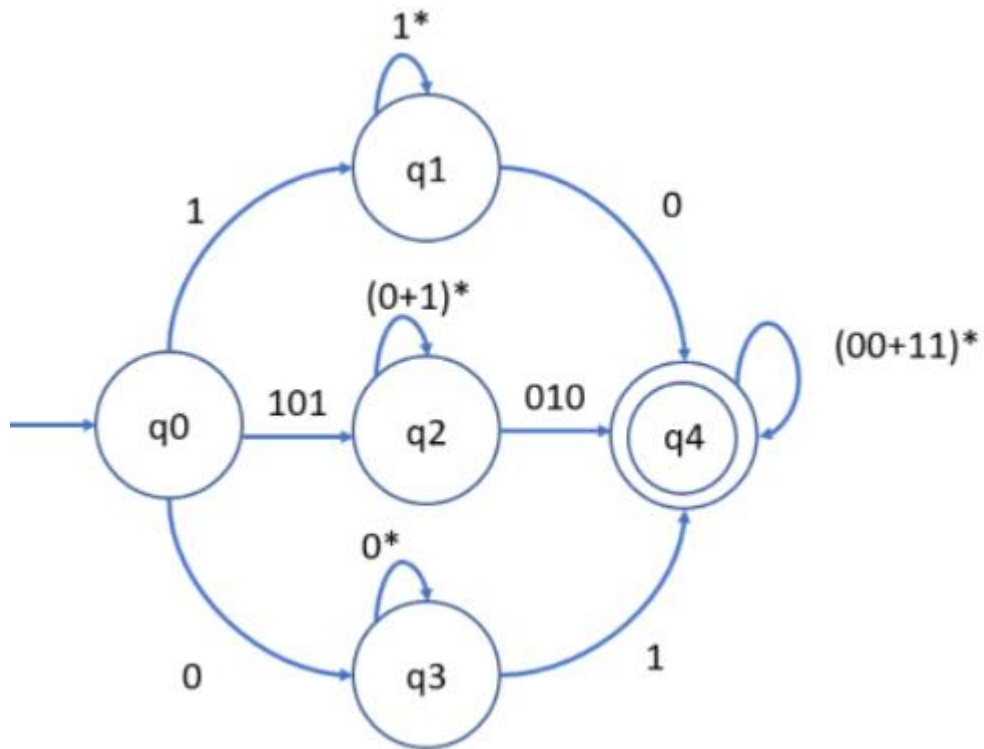
(3+3) Points

- Design the NFA for all the strings with even number of 0's followed by an odd number of 1's. Defined over alphabet $\Sigma = \{0,1\}$.
- Design the NFA for the set of all strings in which both the number of a's and the number of b's are even. Defined over alphabet $\Sigma = \{0,1\}$.

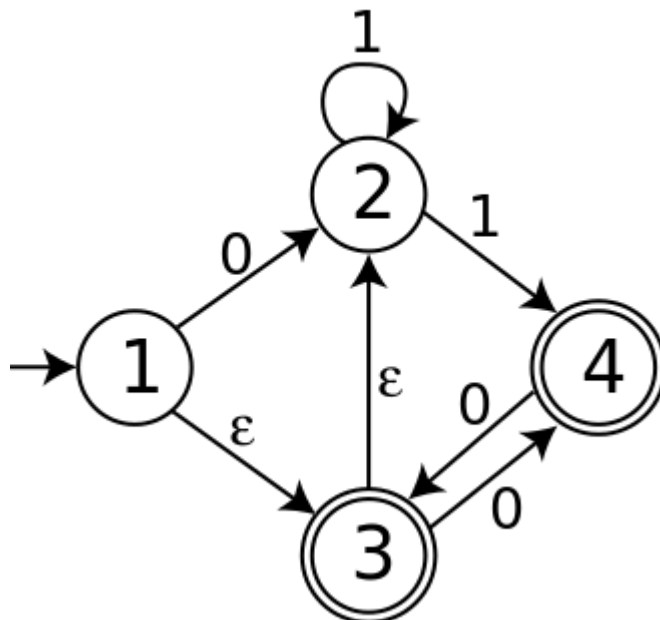
Question 4: Generalized Transition Graph and NFA to DFA.

(10+5) Points

a. Find the regular expression of given GTG using state elimination method.



b. Convert the following ϵ - NFA to DFA.



Best of Luck