NATIONAL INSTITUTE OF TECHNOLOGY TIRUCHIRAPPALLI
END SEMESTER EXAMINATION - Jan. 2021 SESSION

DEPARTMENT : COMPUTER SCIENCE AND ENGINEERING

DATE & TIME OF CTI : 01/03/2021 10:00 am

SUB CODE : CSPC41 DURATION: 1 hour + 10 mins (submission)

TITLE : Formal Languages and Automata Theory

FACULTY NAME : R. LEELA VELUSAMY Max marks: 20

Note to Student: Answer all the questions. Detailed answer is expected.

1. Convert the following NFA given in Figure 1 to DFA and write the regular expression after conversion. (3)

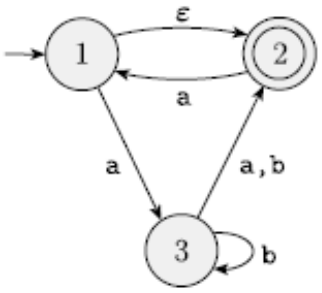

Figure 1

2. Give state diagrams of DFA's recognizing the following languages. In all parts, the alphabet is {0, 1} (4)
   a. {w | w starts with 0 and has odd length, or starts with 1 and has even length}
   b. {w | w is any string except 11 and 111}
3. Find the regular expression for the DFA given in Figure 2. (3)

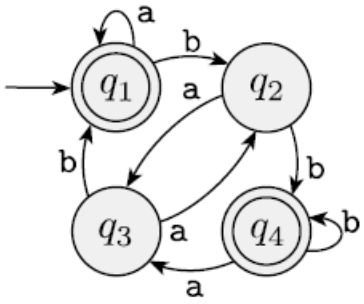

Figure 2

4. We define the **avoids** operation for languages A and B to be (3)

   A **avoids** B = {w | w ϵ A and w doesn't contain any strings in B as a substring}. Prove that the class of regular languages is closed under the avoids operation.

5. Minimize the finite automaton given in Figure 3. (4)

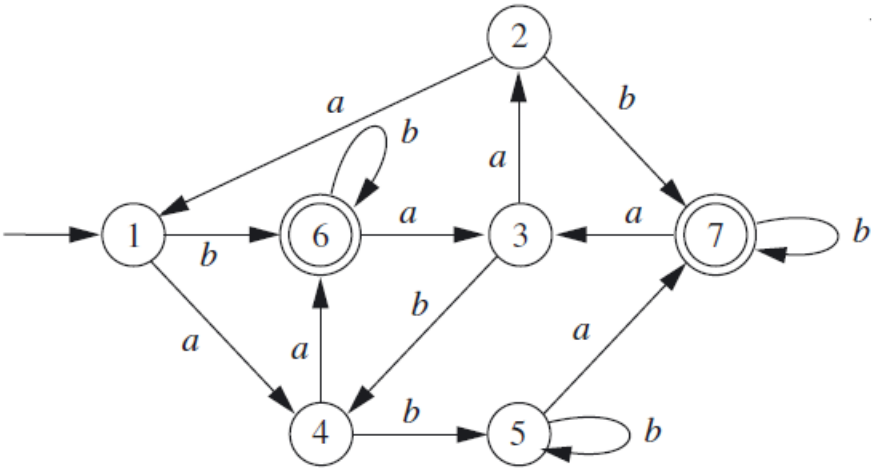

Figure 3

6. Construct a Moore machine that determines whether an input string contains an even or odd number of 1's. The machine should give 1 as output if an even number of 1's is in the string and 0 as output if an odd number of 1's is in the string. (3)

Best Wishes