GANPAT UNIVERSITY
U.V.PATEL COLLEGE OF ENGINEERING
2ICT602 : THEORY OF COMPUTATION
ASSIGNMENT - 1

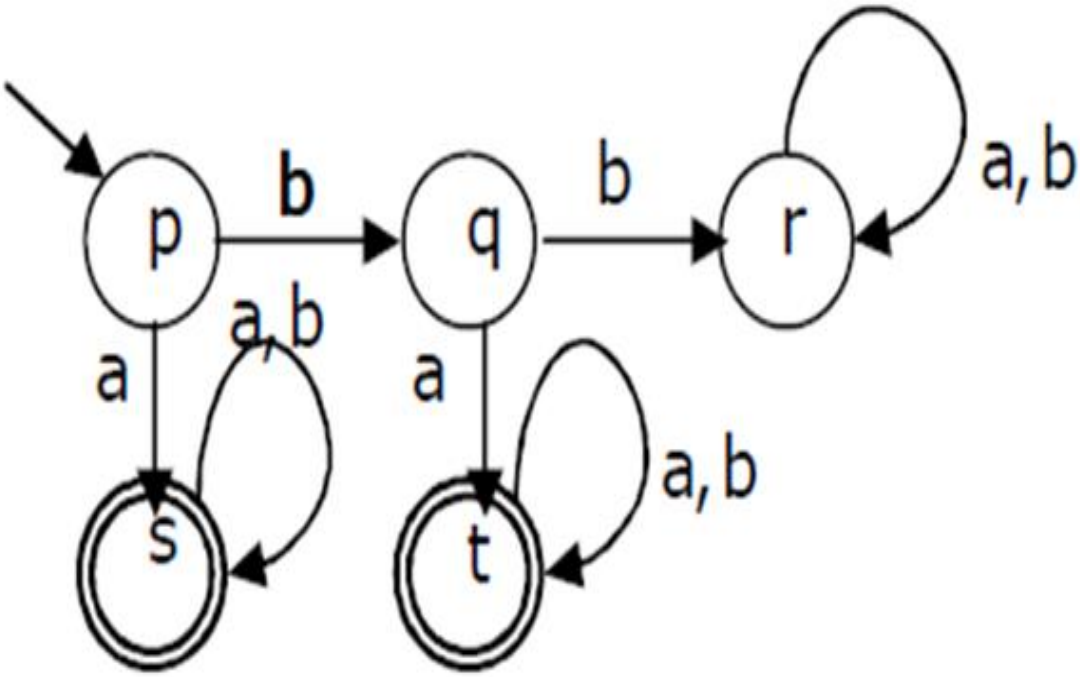
Unit-1: Review of Mathematical Background:

Exercises from the book Introduction to Languages and The Theory of Computation by John C Martin (3rd Edition) - **Chapter-1**

1.4(a,c,e,g),1.13(a,c,e),1.16,1.17,1.19,1.22(a,b),1.28.

Unit-2: Regular Language and Finite Automata

1. Explain Chomsky Hierarchy of formal languages.
2. A deterministic finite automaton (DFA) D with alphabet {a,b} is given below. Give the language that is accepted by it.



3. Write the Regular Expression for the following languages:

   a) The language of strings ending in 1 and not containing 00 over Σ {0, 1}.
   b) The language of strings containing either ab or bba as substring over Σ {a, b}
   c) The language of all the strings containing exactly two 0's over Σ {0, 1}.
   d) The language of all strings that do not end with 01 over Σ {0, 1}.
   e) The language of all strings not containing 00 over Σ {0, 1}.

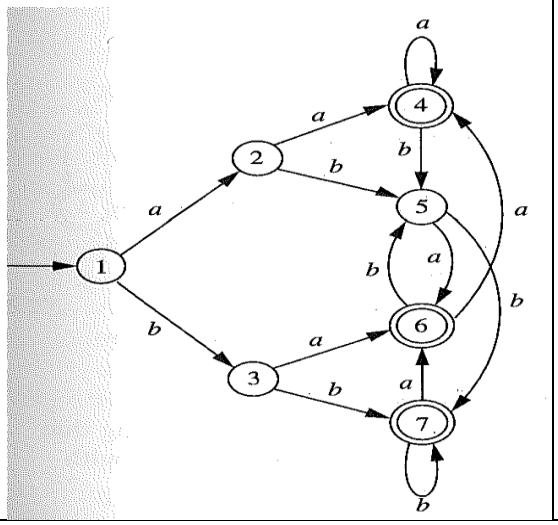
4. Construct the minimal DFA that accept all string of a's and b's where

   a) All String end with b and not containing substring "aa"

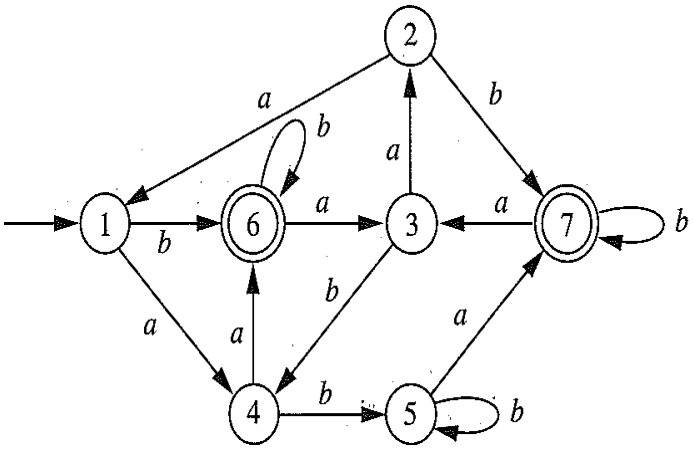
b) String contain both "ab" and "ba" as a substring.
c) Starting start with b and do not end with "ba"
d) All String start with a and length of the string is divisible by 3.

5. Minimize the following DFA.

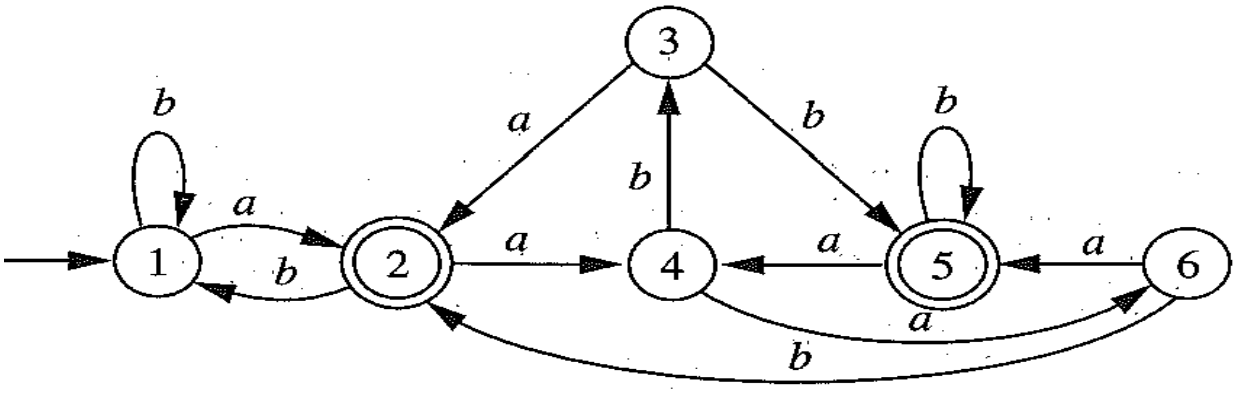
(A)



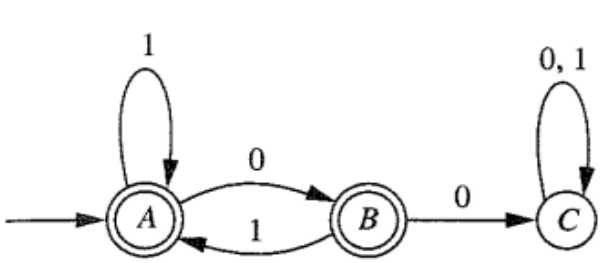
(B)



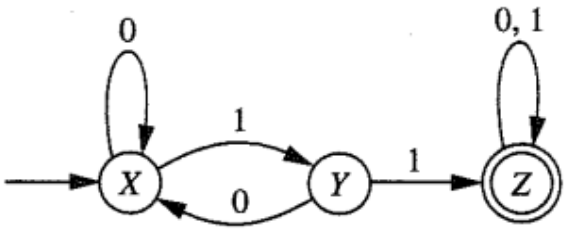
(C)



6. Let M1 and M2 be the DFA as given below, recognizing the languages L1 and L2 respectively:



M1

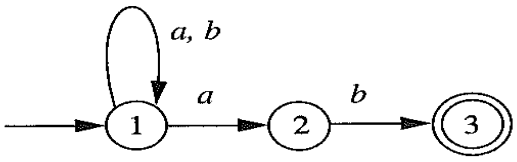


M2

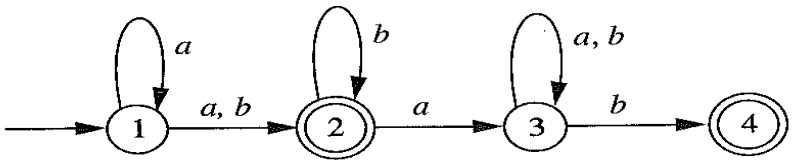
Draw the DFA recognizing the following languages:
L1 U L2

L1 – L2

7. Converts NFAs given in the figures into DFA that accepts the same language



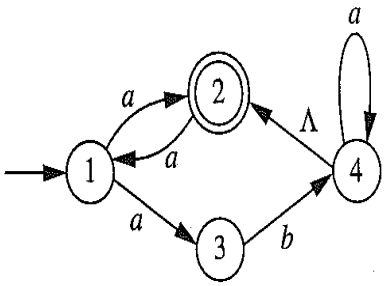
(a)



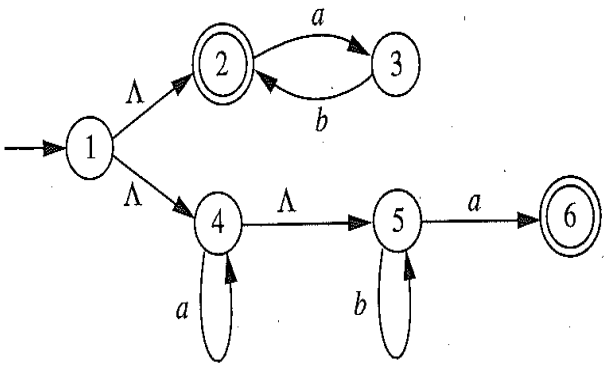
(c)

8. Consider the following figure a and b of NFA-ε. Convert it to the corresponding NFA.

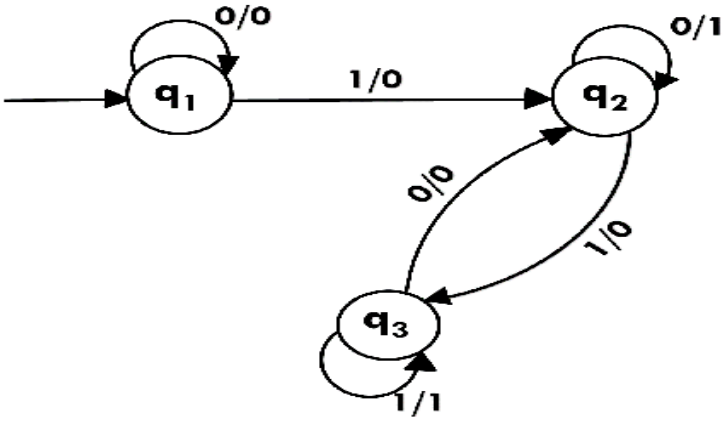
(a)



(b)



9. For the (0+1)*(011+01010)(0+1)* RE draw an NFA-ε recognizing the corresponding language.
10. Design a Moore machine for a binary input sequence such that if it has a substring 011, the machine outputs X, and if the input has substring 110, it outputs Y otherwise it outputs Z for all strings over the Σ= {1,0}.
11. Design a Mealy machine with the input alphabet {0, 1} and output alphabet {Y, N} which produces Y as output if the input sequence contains 1010 as a substring, otherwise, it produces N as output.
12. Convert the following Mealy machine to the Moore machine:



Submit the assignment on or before 01/04/2024