Nepal College of Information Technology

Theory of Computation

Assignment 2 *submission date: 2079/09/018 Monday*

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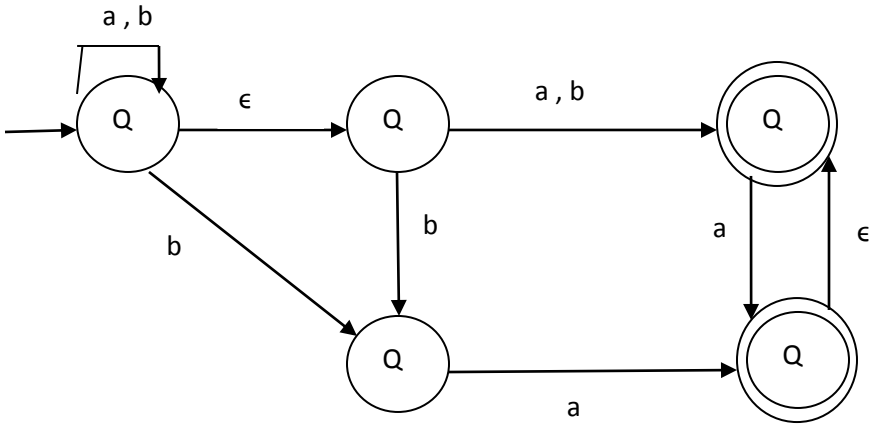
1. Write a regular expression for the language
    a. L Containing odd number of zero's over an alphabet ∑ = {0,1}
    b. L Having even length over an alphabet ∑ = {0,1}
    c. L={w∈{a,b}* : number of a is divisible by 3}
    d. L={w∈{a,b}* : w contains odd number of a followed by even number of b}
2. What is a finite automaton? Explain with the help of block diagram.
3. How finite automata are useful in various fields? Design a DFA that accepts the language given by L={w∈{0,1}* : w does not contain four consecutive 0's}. Hence test your design for 01010001.
4. Design a DFA which accepts the language
    a. L = {w∈{0,1}* : w contains four 1's}
    b. L = {w∈{0,1}* : w contains '00' as substring}
    c. L = {w∈{0,1}* : w has neither '00' or '11' as substring}
    d. L = {w∈{0,1}* : w has no. of '*a*' multiple of 3}
5. What is NFA? Why is it so called? Explain with example.
6. Design NFA for following:
    a. L = {w∈{a,b}* : w contains '*aa*' as substring }
    b. L = {w∈{0,1}* : w contains '0110' or '1001' as substring }
7. Construct a NFA corresponding to the regular expression ((ab U aab)a*)*.
8. Construct an equivalent DFA corresponding to NFA of above Q.N. 11.
9. Show that the class of regular language is closed under the operation of concatenation.
10. Show that the class of regular language is closed under the operation of union.
11. State closure properties of regular language and explain diagrams.
12. Use the pumping lemma to show whether or not the language L={$a^n b^n c^n$: n≥0} is regular.

13. Construct a DFA equivalent to NFA as shown:



14. Minimize the following DFA (Draw initial diagram first). Specify performed operations in each step.

δ/∑	0	1
→Q0	Q1	Q2
*Q1	Q1	Q3
*Q2	Q2	Q2
*Q3	Q5	Q2
*Q4	Q4	Q2
*Q5	Q4	Q2
Q6	Q5	Q6
Q7	Q5	Q6
*Note: →for start state , * for final state*		