PES UNIVERSITY, Bangalore

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Department of Computer Science & Engineering

Automata Formal Languages & Logic

Question Bank - Unit 1

Deterministic Finite Automata

Questions from the Prescribed Textbook

Topic	Exercise No.	Question No's
DFA	2.1	Q1 - Q17

Extra Questions

1) Given the alphabet is {0, 1}, construct a DFA that accepts L ={w | w starts with 0 and has odd length, or starts with 1 and has even length}.

2) Given the alphabet is {0, 1}, construct a DFA that accepts L = {w | the length of w is at most 5}.

3) Given the alphabet is {0, 1}, construct a DFA that accepts L ={w | w is any string except 11 and 111}.

4) Given the alphabet is {0, 1}, construct a DFA that accepts L = {w | every odd position of w is a 1}.

5) Given the alphabet is {0, 1}, construct a DFA that accepts L ={w | w contains at least two 0s and at most one 1}.

6) Give a DFA/NFA for all strings in $\{0, 1\}^*$, which represent (in binary) numbers which leave a remainder of 3 on dividing by 5.

7) Construct a DFA over the alphabet {a, b} such that the second symbol in the string is same as the penultimate. [Assume minimum length of the string is 4].
   Note: Penultimate is the second last symbol.
   Hint: First and Last symbol could be either a or b. Second and Second last symbol must be the same. In between, we can have any number of symbols

8) Construct a DFA over the alphabet {a, b} such that first symbol in the string is same as the last symbol and second symbol is same as the penultimate.

9) Construct a DFA that accepts binary strings that contains the substring 101 ; but before the substring 101 appears you must have seen odd number of 0's.

10) Construct a DFA over the alphabet {0,1} that accepts the following language:
    L = {w| w mod 3 = 0 where w contains no leading 0's}

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Example :
The DFA does not accept the following strings: 00, 0000011

11) Construct a DFA that accepts strings containing at least two a s and ending with an even number of b s.

12) Construct a DFA that accepts Binary strings with no consecutive 0 s.

13) Construct a DFA that accepts strings over $\{a, b\}$ in which either all even-numbered symbols are a or all odd-numbered symbols are b. Show the computation for the string $w_1 = aababaa$ and for $w_2 = babaab$.

14) Construct a DFA that accepts the set of all strings that are palindromes of length 4. The alphabet is $\{a, b, c\}$.

15) Construct a DFA that accepts Binary strings containing exactly 2 occurrences of the substring 00.