Fast **National University of Computer & Emerging Sciences, Karachi  
Fall-2020 CS-Department  
Assignment 1**

**Deadline 5 March 2021**

|  |  |
| --- | --- |
| **Course Code: CS301** | **Course Name: Theory of Automata** |

**Question 1:**

Develop a regular expression for the following language over the alphabet P = {a, b} such that:

1. It accepts all strings in which the letter b is never tripled. This means that no word contains the substring bbb.
2. It accepts all string of length 3.
3. It accepts all string of length greater than or equal to 3.
4. It accepts all string of length less than or equal to 3.
5. It accepts all strings for at least 2 a’s.
6. It accepts all string whose 38 th symbol from right end is ‘a’.
7. |w|= 0 (mod 3).
8. |w|= 0 (mod 3).
9. It accepts all strings, first character ‘a’ or ‘b’ followed by any string in ‘b’.
10. It accepts all strings contain at least one double letter.
11. It accepts all strings contain exactly one occurrence of double letter.
12. It accepts all strings should contain double letter.

**Question 2:**

Design a DFA for the following language such that:

1. Design DFA for string having 101 or 110 as a sub string.
2. Design DFA which accepts string those have exactly two zero’s anywhere.
3. Design DFA to which all string end with 00 consecutive.
4. Design DFA which accept string contain aabb, abbba,bbb.
5. Design DFA which accepts strings in which every ‘00’ is followed immediately by’1’ for example, the strings are 001, 0010 ,0010011001 in the language but 0001 and 000100 are not.
6. Design DFA for divisibility of 6 over the alphabet P = {0,1,2,3,4,5,6,7,8,9} .
7. Design a DFA which check whether a given decimal number is “EVEN”.
8. Design a DFA which can check the given string (length of string) is 2 mod 7 or not or |w| =2 mod 7.
9. Design DFA to check that given binary number is divisible by ‘5’.
10. Design DFA which can accept string if it contains odd number of 0’s and even number of 1’S.