# Riphah International University

# Riphah School of Computing and Innovation

## Theory of Automata

Assignment 1

Note: Submit Hand written assignment on proper pages.

Q1- Which of following languages are valid or invalid. Give answer about each of below with proper reasoning

i. Σ= {B, Ba, bab, d}
ii. Σ = {a, b, c, d}
iii. Σ = {0, 1, 10, 11, 01, 00}
iv. Σ = {Ba, a, c, Ca, d, Aa}
v. Σ= {BaaB, Cab, Cad, eof}

Q2- Write the descriptive definition of followings

i- Descriptive definition of the language **of strings of odd length, defined over Σ={a,b,c}**
ii- Descriptive definition of the language **of strings of even length, defined over Σ={0,1}**
iii- Descriptive definition of the language **of strings that must start with a and end with c, defined over Σ ={a,b,c}**
iv- Descriptive definition of the language **of strings that does not start with b, defined over Σ ={a,b,c}**

v- Descriptive definition of the language of t**he strings of length 2, defined over Σ ={X,Y,Z}, can be defined as**

vi- Descriptive definition of the language of t**he strings of length 3, defined over Σ ={a,b,c}, can be defined as**

vii- Descriptive definition of the language **of the strings of length 1, defined over Σ ={0,1,2}, can be defined as**

viii- Descriptive definition of the language EQUAL-EQUAL, **of strings with a number of 0's equal to the number of 1's, defined over Σ={0,1}, can be defined as**

ix- Descriptive definition of the language **of** EVEN-EVEN , **of strings with even number of a's and even number of b's, defined over Σ={a,b,c}, can be defined as**

x- Descriptive definition of the language of $a^n b^n$ and of strings defined over Σ={a,b}, {$a^n$ $b^n$ : n=1,2,3,…}, can be defined as

Q3- Write the Regular expressions of following

1. Regular Expression for no 0 or many triples of 0's and many 1 in the strings.
2. Regular Expression for strings of one or many 11 or no 11.
3. A regular expression for ending with abb
4. A regular expression for all strings having 010 or 101.
5. Regular expression for Even Length Strings defined over {a,b}
6. Regular Expression for strings having at least one double 0 or double 1.
7. Regular Expression of starting with 0 and having multiple even 1's or no 1.
8. Regular Expression for an odd number of 0's or an odd number of 1's in the strings.
9. Regular Expression for having strings of multiple double 1's or null.

10. Regular Expression (RE) for starting with 0 and ending with 1.
11. RE for ending with b and having zero or multiple sets of aa and bb.
12. A regular expression of the second last symbol is 1.
13. RE for starting with 1 having zero or multiple even 1's.
14. Regular Expression for multiple a's and multiple b's.
15. RE for exactly single 1 many 0's |exactly single a many b.
16. A regular expression for strings starting with aa and ending with ba.
17. A regular expression for the language of all consecutive even length a's.
18. A regular expression for the language of all odd-length strings
19. A regular expression for the language of all even length strings but ends with aa.
20. A regular expression for the language of an odd number of 1s.
21. A regular expression for the language of even length strings starting with a and ending with b in theory of automata.
22. A regular expression for the language of all even length strings but starts with a.
23. A Regular Expression for the Language of all strings with an even number of 0's or even number of 1's.
24. A regular expression for the language of all those strings end with abb.
25. A regular expression for string having must 010 or 101.
26. Regular expression of strings begin with 110 Regular expression of strings begin and end with 110

Regular expression of strings containing exactly three consecutive 1's.

27. A Regular Expression of all strings divisible by 4.
28. A Regular Expression Strings that does not contain substring 110.