

# Theory of Automata (CS402)

## Assignment No.1

### Deadline

Your assignment must be uploaded before or on 18<sup>th</sup> April, 2011

### Rules for Marking

It should be clear that your assignment will not get any credit if:

- The assignment is submitted after due date
- The assignment is copied

### Objectives

Objective of this assignment is to make students able to understand the following concepts,

- Recursive Definition of a language
- Regular Expression
- Finite Automata

### Question No.1

#### RECURSIVE DEFINITION

- Give recursive definition of language defined over alphabet  $\Sigma = \{a, b\}$ , having all strings **STARTING WITH aa OR ENDING WITH bb**
- Give recursive definition of language defined over alphabet  $\Sigma = \{a, b\}$ , having all strings with length **MULTIPLE OF 2**
- Give recursive definition of language defined over alphabet  $\Sigma = \{a, b\}$ , having all strings **NOT ENDING** with aa or bb
- Give recursive definition of language defined over alphabet  $\Sigma = \{a, b\}$ , **NOT HAVING** ab at any place.
- Give recursive definition of **ODD PALINDROME** (PALINDROME WITH ODD STRINGS ONLY) defined over alphabet  $\Sigma = \{a, b\}$

### Question No.2

#### REGAULAR EXPRESSIONS

Give Regular Expression for each of the following language defined over alphabet  $\Sigma = \{a, b\}$

- Language having all strings **STARTING AND ENDING WITH ab**
- Language of strings **NOT** having bb OR aa at any place
- Language of all strings **NOT HAVING aab** in start
- Language of all strings **NOT HAVING aab** in end
- Language of all strings **HAVING** count of b's multiple of 2 [No restriction on count of a]

### Question No.3

#### FINITE AUTOMATA

Give Finite Automata for each of the following language defined over alphabet  $\Sigma = \{a, b\}$

- a. Language having all strings with alternating a's and b's , some example strings are ababab... or bababa...
- b. Language having all strings NOT containing aa at any place
- c. Language of all strings NOT STARTING with bb
- d. Language of all strings STARTING WITH bba
- e. Language having all strings NOT having even no of a's and b's

**You can view the video tutorial in file, <http://vulms.vu.edu.pk/Courses/CS402/Downloads/Assignment1.00.zip> to see how to make FA in MS Word.**

#### Important Note:

While attempting any question always remember the following points:

- Where OR is used in the description of a language it means that expressions on both sides of 'OR' are parts of the language.
- Where NOT is used in the description of the language it means that language includes all strings except described in the 'NOT' condition, for example language NOT starting with a, means all strings not having **a** in the start (you have to evaluate yourself what kinds of strings are these).

#### Assignment Uploading Instructions:

- Upload single word file having solutions for all parts as well as chart images.
- You can crop and compress images in the word file by double clicking on an image and selecting compress all images option to decrease file size before uploading it.