

CS402 Theory of Automata

Mid Term Examination – Spring 2006

Time Allowed: 90 Minutes

Please read the following instructions carefully before attempting any question:

1. This examination is closed book, closed notes, closed neighbors.
2. Answer all questions.
 - a. There is no choice.
 - b. You will have to answer correctly all questions in this examination to get the maximum possible marks.
3. Do not ask any questions about the contents of this examination from anyone.
 - a. If you think that there is something wrong with any of the questions, attempt it to the best of your understanding.
 - b. If you believe that some essential piece of information is missing, make an appropriate assumption and use it to solve the problem.
4. You are allowed to use any Software for Diagrams and Symbols like MS Word, MathType and Visio etc.

****WARNING: Please note that Virtual University takes serious note of unfair means. Anyone found involved in cheating will get an `F` grade in this course.**

Question No. 1

Marks : 1

If $s=abcd$ is a string defined over $\Sigma = \{a,b,c,d\}$ then reverse of s is $dcba$.

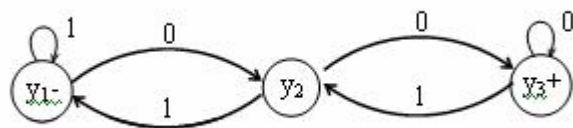
- ★ True
- ★ False

Question No. 2

Marks : 10

Find the regular expression associated to the following FA. Show all steps.

[Hint: ϵ is the empty string]



Question No. 3

Marks : 1

$\Sigma = \{aa, b\}$, $\text{length}(aaaabaabb) = 5$.

- ★ True
- ★ False

Question No. 4

Marks : 1

Every NFA can be converted into FA.

- ★ True
- ★ False

Question No. 5

Marks : 1

There can be more than one start states in TG.

- ★ True
- ★ False

Question No. 6

Marks : 1

A regular language can not be infinite.

- ★ True
- ★ False

Question No. 7

Marks : 10

a) Write the recursive definition of the following language. [6]

$L =$ Defining the language $\{a^{2n}b^{4n}\}$, $n=1,2,3,\dots$, of strings defined over $\Sigma=\{a, b\}$

b) Write a regular expression of the language having strings that either start or end with “00” and have no more zeroes. Where the alphabet is {0, 1}. [4]

Question No. 8

Marks : 1

Kleene star of {1} generates {1, 11, 111, 1111, 11111}.

- ★ True
- ★ False

Question No. 9

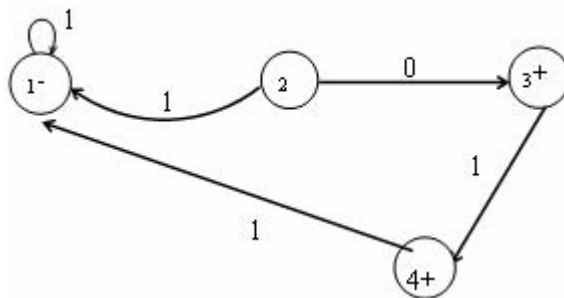
Marks : 10

a) Define NFA-null.

[4]

b) Draw DFA for the following NFA.

[6]



Question No. 10

Marks : 1

If a regular language is empty then we denote it like $L = \emptyset$ (fi).

- ★ True
- ★ False

Question No. 11

Marks : 1

Recursive method for defining language is only for regular languages.

- ★ True
- ★ False

Question No. 12

Marks : 1

$aa^* = a^+$?

- ★ True
- ★ False

Question No. 13

Marks : 1

The language equal means number of a's and b's are equal with null string.

- ★ True
- ★ False