The Open University of Sri Lanka
B.Sc Degree Programme: Level 05
CSU3275/PMU3293 – Automata Theory
Department of Mathematics & Computer Science
The Open Book Test – OBT (2010/2011)
Duration: One & Half hours($1^1/_2$ Hours)

Date: 24.03.2011 **Time:4.00pm – 5.30pm**

Answer ALL questions

Question 01

(a) Provide two examples of strings belonging to, and two examples of strings not belonging to, the following language L over the alphabet $\Sigma = \{a, b\}$.

$$L = \{w \in \Sigma^* \mid w = uu^R u \text{ for some } u \in \Sigma\Sigma\}$$

(b) Using the mathematical induction on the length of x, show that $(xy)^R = y^R x^R$ for any two strings x and y. Hence or otherwise show that $(w^R)^R = w$ for any string w.

Question 02

(a) Design a deterministic finite automaton (DFA) to accept the language L over the alphabet {0, 1} that does not contain the strings having two consecutive 1s.

Test your DFA on the following input strings.

(i) 1010
(ii) $01(01)^*0$
(iii) 010

(b) Design a DFA to recognize strings over the alphabet $\{a, b\}$ that do not have aba as a substring.

Question 03

Design a nondeterministic finite automaton (NFA) to recognize the set of all strings w, including the empty string, over {0, 1} such that the sequence of symbols in w terminates as soon as it encounters that the symbol is different from the starting symbol. For example, the strings 1110 and 110 are accepted while 11100 and 011 are not.

Test your NFA for the following inputs.

(i) 1010
(ii) 0^*01
(iii) 1^*0