THE OPEN UNIVERSITY OF SRILANKA

B.Sc. DEGREE PROGRAMME- Level 05

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

CPU 3144-THEORY OF COMPUTING

NO BOOK TEST-02 (NBT-02) 2015/2016

DURATION: ONE HOUR ONLY (01 HOUR)

DATE: 30.10.2016   TIME: 01.00 pm - 02.00 pm

Answer ALL Questions.

1)

I.   What is a sentential form and a sentence in a string?

II.   Given that $G = \{ \{S\}, \{a, b\}, P, S \}$ where

        P is S → aSb

        S → ∈

        Use the definition given in part (I) to find the sentential forms and the sentence.

III.   Give the definition of a **State Transition System (STS)**.

IV.   What is the main difference between a **Deterministic Finite Automation (DFA)** and a **Nondeterministic Finite Automation (NFA)**?

V.   Let Σ be a given alphabet and r_1 and r_2 are regular expressions. What are the other regular expressions that can be formed by r_1 and r_2?
        Using the above expressions find $L (a^*.(a + b))$ in set notation.

VI.   What are the three main types of machines that you have learnt under this course?
        According to the power of the machines write the names in the increasing order. Justify your answer.

2) Consider the following Deterministic Finite Automation(DFA)
   $\{\{q_0, q_1, q_2\}, (0,1), \delta, q_0, q_2\}$ with the transitions
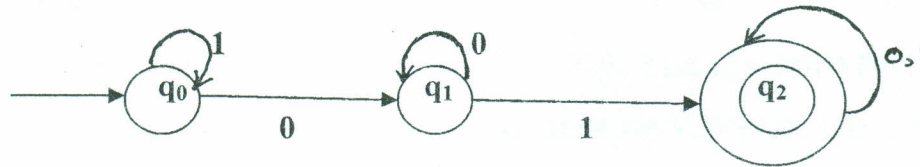
Use the three conditions given below

a) $\delta^*(S, \in) = S$

b) $\delta^*(S,a) = \delta(S,a)$

c) $\delta^*(S, a\omega) = \delta^*(\delta(S, a), \omega)$

   Check whether **010** is accepted by the above DFA. (Show all your workings step by step.)