King Fahd University of Petroleum and Minerals College of Computer Sciences and Engineering Department of Computer Engineering

COE 202 – Digital Logic Design (T161)

Homework # 05 (due date & time: Tuesday 27/12/2016 during class period)

*** Show all your work. No credit will be given if work is not shown! ***

Problem #1 (45 points): Drive the state diagram for the following circuit (show all the steps of your work):



Problem # 2 (45 points): Design a <u>Moore</u> sequential circuit with **minimal number of states** that will be used in a vending machine that dispenses 20 SR account recharging cards for prepaid phones (e.g., SAWA, Mobily, Zain). The circuit can only accept 10 SR and 50 SR bills (i.e., cannot accept 1 SR, 5 SR, 20 SR, 100 SR, 200 SR, 500 SR bills), and can only accept one bill at a time (i.e., cannot accept 2 or more bills at the same time). The circuit should have 2 outputs. One output will be set to 1 when the circuit is ready to dispense the card (i.e., sufficient funds were deposited), while the other output will be set to 1 when the circuit and any other necessary logic gates to design the circuit. Show all steps of the design.

Problem # 3 (10 points): In the circuit shown, the component at the top is a D-type flip flop and the component at the bottom is a clocked D-latch. Plot the waveforms at outputs Q1 and Q2 for the clock and external input waveforms indicated. Assume that both components were initially reset (i.e., Q1 = Q2 = 0).

