**Assignment 1 of CS 3211, 2010, Total 10 marks**

Please submit in the IVLE workbin by **Monday 18 February 9:59 PM. Kindly note the time.**

**Kindly note that there will be no extensions. If you are not finished by the deadline, please submit whatever partial answer you may have - this is better than not submitting at all. Only submissions in the IVLE Workbin will be graded. Please try to submit at least 15 minutes ahead of the deadline to avoid last minute rush.**

Upload one **single Word file** containing all the answers.

***Please submit to IVLE Workbin folder Lab1.***

**Question 1**. A sensor measures the water level of a tank. The level is measured as a value in the range 0…9 (the initial level is 5). If the level is less than 2, the sensor outputs a *low* signal. If the level is greater than 8, the sensor outputs a *high* signal. In all other situations, the sensor outputs a *normal* signal. Model the sensor as a single process in Promela. Conceptually, you could think of the sensor to be communicating with the physical environment regarding the water level information. However, in this question, you do not need to model the physical environment itself – modeling the sensor process is sufficient for answering this question. **[3 marks]**

**Question 2**. A drinks machine charges 15 cents for a can of Ribena. The machine accepts coins of denomination 5 cents, 10 cents, 20 cents and gives changes. While purchasing a drink, a user gives the least possible value greater than or equal to 15 cents based on the coins available. You can assume that the machine only gives out one Ribena can at a time, after the user makes payment. Also, if the user's payment is not sufficient, the machine keeps on waiting for the remaining payment.

Model the machine as a process called MACHINE in Promela. In addition, model a separate process called USER which captures all possible behaviors a human user of the drinks machine can demonstrate. The overall system description should be a concurrent composition of the MACHINE process and the USER process. **[4 marks]**

**Question 3.** Consider the client-server system discussed in class via process equations.

*CLIENT = call -> wait -> continue -> CLIENT*

*SERVER = request -> service -> reply -> SERVER*

*CLIENT_SERVER = (CLIENT || SERVER) /{call/request, reply/wait}*

Extend the system such that there are two clients, and each client is such that the *call* may be followed by a *timeout*, instead of *wait*ing for the server's *reply*. Thus, it is possible for each client to *timeout* and then *continue*. Any comments on this extended concurrent system? Is it a "good" design? **[3 marks]**