CAVENDISH CAMPUS

School of Electronics and Computer Science

Modular Undergraduate Programme
First Semester 2011 – 2012

Module Code: ECSE603

Module Title: ***Sample FSP Questions***

Date: May 2012

Time: 10:00 – 12:00

Instructions to Candidates:

These are 2 example exam questions on FSP.
Similar style questions will appear in the exam paper.
Each question is worth 33 marks.

Question 1

(a) What is the Finite State Process (FSP) view of a process and how are these processes modelled? **[8 marks]**

(b) Given the following FSP process:

```
MINUTE_ALARM( N = 60 ) = COUNTER[ N ] ,

COUNTER[ i : 0..N ]
    = (  when( i > 0 )  tick -> COUNTER[ i - 1 ]
       | when( i == 0 )  sound.alarm -> STOP
      ) .
```

(i) Explain the meaning of the following FSP language features used in this process: "`N = 60`", "`|`", "`when ( i == 0 )`" and "`STOP`". **[8 marks]**

(ii) With reference to the above process explain the meaning of the following terms:

- *Transition*
- *Trace* **[4 marks]**

(c) For each of the following FSP processes give the corresponding:

- *Labelled Transition System Graph*
- *Trace Tree*.

(i)
```
RHYME = ( one -> two -> buckle
            -> my -> shoe -> STOP ).
```
[5 marks]

(ii)
```
CHANGE =
( fivep ->
       (   onep -> onep -> onep -> onep -> onep -> CHANGE
         | twop -> twop -> onep -> CHANGE  ).
```
[8 marks]

Question 2

The following is a specification of a husband and wife shared bank account system consisting of people processes sharing a bank account.

- A shared bank account called `BANK_ACCOUNT`, that can have money withdrawn from it or deposited into it.
- A "stay at home" husband process called `JIM`, that repeatedly withdraws money from the account.
- A "a career minded" wife process called `KATE`, that repeatedly deposits money into the account.
- The husband and wife processes share the bank account and must obviously have **mutually exclusively** access to it when making deposits or withdrawals.
- The system consists of the **two** human processes, and the **one** bank account process.

(a) Define three Finite State Process (FSP) language processes to model the `BANK_ACCOUNT`, `JIM` and `KATE`. **[25 marks]**

(b) Using your three types of processes define a composite process that models the complete system. **[5 marks]**

(c) Briefly explain how you have ensured that the two processes `JIM` and `KATE` have *mutually exclusive* access to the shared bank account process `BANK_ACCOUNT`. **[3 marks]**