UECS2103/2403/2423 Operating Systems
Tutorial 1

1. List all the components of a process.

2. List three general categories of information in a process control block.

3. What is the difference between blocked process and suspended process?

4. Consider a program contains 2 buffers, namely **buf_1** and **buf_2**, and 2 functions, namely **feeder()** and **calculator()**. feeder() will store 2 numbers into buf_1 and buf_2 separately. The calculator() function must read both numbers to perform its calculation.
   Briefly describe a scenario during the execution of the process that causes the following state transitions.

   Running → Ready→ Ready/Suspend → Ready

5. Determine the state transitions of process A based on 7-state process model for the scenario below.
   - Process A is created and then executes.
   - Time slices of process A exhausted and the execution is switched to process B.
   - Process A continues to execute when time slice of process B is exhausted.
   - Process A is then waiting for I/O operation to be completed.
   - Process A is swapped out to secondary memory.
   - I/O operation completed and process A continues its execution.
   - Process A is interrupted and execution is switched to interrupt service routine.
   - Process A is swapped out from main memory.
   - User terminates process A.

6. Process X is created when a program is executed. First of all, process X executes till its time slices exhausted before process Y is selected to execute. Process X continues its execution when process Y is blocked. Process X will then transfer data to storage before it proceeds to second stage. While process X is waiting for the data to be transferred, process W executes. Process W requires more memory space to store its data, and process X is swapped out to the secondary memory. While process W is running, the data of process X has been fully transferred to storage. Process X continues its execution after process W has terminated, and then exits normally.

   a) Describe the steps to create process X.

   b) Determine all the state transitions of Process X during its life cycle based on 7-state model.

7. Process P is created and ready to execute. However, before P is selected to execute, it is swapped into the secondary memory because the currently running process, Q, requires additional memory in data processing. P is selected to execute when Q terminates, until its time slices exhausted. When P continues to execute again, it waits for files to be transferred from communication port. However, there is an error occurs and P is terminated by the operating system.

   a) Determine all the state transitions of Process P during its life span based on 7-state process model.

   b) Describe the steps in switching from process P to Q.