The Open University of Sri Lanka
B.Sc. Degree Programme: Level 05
Department of Mathematics and Computer Science
Closed Book Test 1 - 2011/2012
CPU3242 – OPERATING SYSTEMS
DURATION: One and Half hours

Date: 04/09/2011 **Time: 1.30pm – 3.00pm**

Answer All Questions

QUESTION 1

1.1) What is an *operating system*? Explain the purpose of having a kernel in an operating system.

1.2) Give the major activities of *process management* and *main memory management*.

1.3) Explain the operating system's functions in terms of
(i) Systems View
(ii) Programmers View

1.4) Give 3 different definitions for a process in an operating system. Draw process state transition diagram to depict the process states and reasons for state transitions.

QUESTION 2

2.1) What is a *Thread* in an Operating system? Give similarities and differences of a *Thread* and a *Process*.

2.2) Give advantages of Threads over multiple processes.

2.3) Explain the terms *Starvation* and *Aging* which are used in process scheduling.

2.4) Consider the following set of processes, arrival times and CPU bursts in answering section 2.4.

Process	Arrival Time (ms)	Burst Time (ms)
P1	0	10
P2	3	6
P3	5	4
P4	6	2

(i) Assuming that the FCFS scheduling algorithm is used, draw the Gantt chart of process execution. Calculate average turnaround time and average waiting time.

(ii) Assuming that the SJF scheduling algorithm with preemption is used, draw necessary Gantt charts and calculate the average turnaround time and average waiting time. (state your steps and assumptions clearly)

QUESTION 3

3.1) Give a real world example for a Deadlock.

3.2) What are the four necessary conditions required for a deadlock to occur?

3.3) Draw a clear resource allocation graph based on the information below.

(The sets P - processes, R - resources, E- edges as follows)

P = {P1,P2,P3,P4}

R = {R1, R2, R3, R4}

E = {(R1,P1),(P2,R2),(P3,R2),(R4,P1),(P3,R3),(P3,R4),(P1,R2),(P1,R4),(R2,P4), (P4,R3)}

The number of resource instances are

R1 has 2 instances
R2 has 1 instance
R3 has 1 instance
R4 has 3 instances

3.4) Using the resource graph that you have drawn in section 3.3, identify deadlock sequences (if any). Justify your answer.