The Open University of Sri Lanka
B.Sc. Degree Programme: Level 05
Department of Mathematics and Computer Science
No Book Test 1 - 2012/2013
CPU3242 – OPERATING SYSTEMS
DURATION: One and Half hours

Date: 15/02/2013 **Time: 4.00pm – 5.30pm**

Answer All Questions

QUESTION 1

1.1) List the functions of a kernel in an operating system?

1.2) Why hiding details of hardware and creating abstraction is necessary in an operating system?

1.3) Briefly explain **five** (5) factors affecting scheduling decisions of an operating system.

1.4) Compare batch operating system and time sharing system.

QUESTION 2

2.1) What is a process control block (PCB)? List three fields that are present in PCB.

2.2) List **two** (2) applications of a thread in an operating system.

2.3) Consider the following set of processes, arrival times and CPU bursts in answering section 2.3. State your assumptions and show all the calculations.

Process	Arrival Time (ms)	Burst Time (ms)
P1	0	8
P2	3	4
P3	5	1
P4	6	5

(i) Assuming that the SJF scheduling algorithm with preemption is used, draw the Gantt chart of process execution (do not consider priorities). Calculate average turnaround time, average waiting time and average response time.

(ii) Assuming that the round robin scheduling algorithm with time quanta of 4 ms is used, draw necessary Gantt charts and calculate the average turnaround time and average waiting time.

QUESTION 3

3.1) List two similarities and two differences between processes and threads.

3.2) Give a definition for a deadlock.

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

The number of resource instances are

R1 has 1 instance
R2 has 2 instances
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.