The Open University of Sri Lanka
B.Sc. Degree Programme: Level 05
Department of Mathematics and Computer Science
No Book Test 1 - 2016/2017
CPU3242 – OPERATING SYSTEMS
DURATION: One and Half hours

Date: 28/04/2017   Time: 4.00pm – 5.30pm

Answer All Questions

QUESTION 1

1.1)   List **three** (3) objectives of an operating system?

1.2)   What is *kernel* in an operating system? Explain the *privileged state* in an operating system.

1.3)   Draw 5 state process transition diagram for a process in an operating system and briefly explain each state transition.

1.4)   Write an algorithm for the *producer and consumer problem* which operates on a bounded buffer in an operating system.

QUESTION 2

2.1)   List **three** (3) fields in a typical process control block

2.2)   Consider the following set of processes, arrival times and CPU bursts in answering section 2.2. State your assumptions and show all the calculations.

Process	Arrival Time (ms)	Burst Time (ms)
P1	0	15
P2	3	6
P3	5	2
P4	8	3
P5	9	1

(i) Assuming that the SJF scheduling algorithm with preemption is used, draw the Gantt chart of process execution. Calculate the 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 the Gantt chart of the system.

2.2)   Explain the terms *aging* and *convoy effect* in process scheduling of an operating system.

QUESTION 3

3.1)   What are the differences between *kernel level thread* and *user level thread* ?

3.2)   Explain the following Inter process communication related message passing primitives

(i) Blocking vs Non-Blocking

(ii) Direct vs In-direct

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}

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

All resources has 1 instance each

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