The Open University of Sri Lanka
B.Sc. Degree Programme: LEVEL 05
Department of Computer Science
Final Examination 2016/2017
CPU3242 – OPERATING SYSTEMS
DURATION: Three Hours (3 hours)

Date: 10/08/2017 **Time: 1.00pm – 4.00 pm**

Answer **FOUR** Questions **Only**

QUESTION 1

1.1) What is *spooling* in the context of an operating system?

1.2) List **five** (5) major activities of an operating system in terms of process management.

1.3) Explain **five** (5) **services** provided to the user under the programmers view of an operating system.

1.4) Draw an abstract diagram of system components involved in the interaction between a user and the hardware of a computer.

1.5) Draw the 3-state diagram in which a process could be in an operating system. Briefly describe those **three** (3) states.

QUESTION 2

2.1) List the **four** (4) basic events that cause a process to be created.

2.2) Explain **five** (5) major factors affecting scheduling decisions in an operating system.

2.3) Consider a system with one CPU and six jobs, Each job has arrival time and burst time as given below.

Job	Arrival Time	Burst Time
1	0	15
2	1	10
3	4	7
4	5	5
5	7	2
6	10	1

(i) Draw a Gantt chart illustrating the jobs. Using the pre-emptive SJF scheduling algorithm, compute the *average turn around time*, *average waiting time* and *average response time*. Show the calculations.

(ii) Draw a Gantt chart and compute the *average waiting time* for Round Robin (RR) scheduling algorithm with time quanta of 5 units.

QUESTION 3

3.1) Explain the term *multiprogramming* in an operating system.

3.2) Explain the uses of long, medium and short term scheduling in an operating system.

3.3) Give **four** (4) reasons for having cooperating processes?

3.4) List the set of conditions required to achieve the *mutual exclusion* in a given set of processes.

3.5) Write an algorithm (c like code) to solve the *producer consumer problem* using N messages.

QUESTION 4

4.1) Draw a suitable block diagram to show *address translation with paging* in memory management.

4.2) Suppose you have the following page reference string and the frames (0,1,2).

Reference string	2	1	3	4	2	1	3	4	2	1	3	4	5	6	7	8
Frame 0																
Frame 1																
Frame 2																

Use the table above to show frame allocation using the Belady's optimal algorithm. Mark the frame replacement locations using *. (Hint: draw this table in your answer script and fill the blanks)

4.3) Assume that the operating system on your computer uses the buddy system for memory management. Initially the system has 2048KB of memory, which begins at address 0. Show the result of each request/release given below via successive figures.

A: Request 160KB
B: Request 95KB
C: Request 115KB
D: Request 35KB
Release A
E: Request 235KB
Release B
F: Request 109 KB
Release C
Release D
Release E
Release F

4.4) Assuming that the system given in 4.3 has only completed up to the memory request of F, Compute the amount of internal fragmentation that exists in the system at that time.

QUESTION 5

5.1) Give **three** (3) advantages of using threads in an operating system.

5.2) Explain the terms *thread yield* and *thread join* using suitable examples.

5.3) List the **two** (2) methods of handling a deadlock?

5.4) In a System, there is a total of 20 units of resource R1, 10 units of resource R2 and 14 units of resource R3. The system is in the following state (S0).

Process	Max			Allocation		
	R1	R2	R3	R1	R2	R3
P0	5	3	4	3	3	2
P1	7	6	6	4	2	1
P2	6	7	4	4	1	2
P3	6	5	3	2	2	3

(i) Show that the above state (S0) is a safe state. Give the complete sequence of jobs.

(ii) The process P2 requests for the resources (R1, R2, R3) equivalent to units (2, 0, 1) when the system is in state S0. Is it possible to grant the request by P2? Give the process sequence.

QUESTION 6

6.1) List **four** (4) different file types that can exist in an operating system with their functions. Give **three** (3) extensions each for every file type mentioned in your answer.

6.2) List the contents of a typical FCB (File control block).

6.3) Briefly describe *programmed I/O*, *Interrupt driven I/O* and *DMA* schemes in input output management.

6.4) Draw diagrams to describe the functionality of the following disk access scheduling schemes in a disk having 0-999 cylinders. Previous and current head positions are 245 and 300 respectively. The read request sequence is 400,250,500,35,150,585.800. (Hint : Start drawing from the head position 300, scale is not required)

(i) SCAN
(ii) C-LOOK
(iii) SSTF