The Open University of Sri Lanka
B.Sc. Degree Programme: LEVEL 05
Department of Computer Science
Final Examination 2017/2018
CPU3242 – OPERATING SYSTEMS
DURATION: Three Hours (3 hours)

Date: 07/10/2018 **Time: 9.30 am – 12.30 pm**

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

QUESTION 1

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

1.2) "Linux systems are safer than Windows systems when it comes to virus attacks". State probable reasons behind this statement in the context of an operating system.

1.3) Explain an operating system as a,
(i) Resource manager
(ii) Extended machine.

1.4) Explain the **five** (5) services provided in an operating systems under programer's view.

1.5) Compare *Batch operating systems* and *Time Sharing systems*.

QUESTION 2

2.1) Explain *dispatch, timer runout, block* and *wakeup* state transitions of a process.

2.2) Briefly describe **five** (5) fields of a process control block (PCB) of a process 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	5
2	2	2
3	5	2
4	6	1
5	8	3
6	11	1

(i) Draw separate Gantt charts illustrating the above jobs Using **Non preemptive SJF, Preemptive SJF** and **Round robin (time quanta = 3)** scheduling algorithms.

(ii) Compute the *average turn around time, average waiting time,* and *average response time* for above jobs using **preemptive SJF algorithm**. Show the calculations.

QUESTION 3

3.1) List **four** (4) basic events that cause a process to be created in an operating system.

3.2) Draw *a process queuing diagram* showing the use of long, medium and short term schedulers in an operating system.

3.3) Explain RACE condition using an example.

3.4) List typical *characteristic properties of code* that form Critical Section of a process or a thread.

3.5) Write an algorithm (c like code) to solve the *Critical section problem for N process.*

QUESTION 4

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

4.2) Explain the activity named as *thrashing* in the memory management

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

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

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

4.4) Draw a table (single row) to represent following holes / processes in the context of free memory management.

(H,0,4) , (P,10,2) , (H,12,3) , (P,4,5) , (H,9,1) , (P,14,4)

4.5) A 32-bit address is divided into 10-bit segment number, an 14-bit page number and a 8-bit displacement.

(i) How many pages can a segment have?
(ii) What is the page size?
(iii) How many segments can be addressed?

QUESTION 5

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

5.2) Explain the **four** (4) approaches of recovering from a deadlock?

5.3) In a System, there is a total of 25 units of resource R1, 12 units of resource R2 and 16 units of resource R3. The system is in the following state (S0).

Process	Max			Allocation		
	R1	R2	R3	R1	R2	R3
P0	6	4	8	4	3	3
P1	7	6	7	5	3	2
P2	6	7	6	3	0	4
P3	6	6	4	5	3	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, 2) 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 **two** (2) file access methods in a typical file system.

6.2) What is *a symbolic link* in the context of file systems?

6.3) Explain *linked allocation* technique of storing a file using a suitable diagram.

6.4) Briefly describe *Raid 0, Raid 1 and Raid 5* disk management schemes.

6.5) Draw diagrams to describe the functionality of the following disk access scheduling schemes in a disk having 0-499 cylinders. Previous and current head positions are 125 and 100 respectively. The read request sequence is 400, 250, 300, 35, 150, 285, 60. (Hint : Start drawing from the head position 100, scale and calculations are not required)

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