

Sample

The Open University of Sri Lanka
BSc IT Degree Programme : LEVEL 04
Department of Computer Science
Final Examination 2023/2024
COU4302 – OPERATING SYSTEMS
DURATION: Two Hours (2 hours)



001

Date: 25/08/2024

Time: 9.30am – 11.30am

Answer **FOUR (4)** Questions **Only**. All the questions carry equal marks.

QUESTION 1

- 1.1) What are the **two (2)** types of kernel in an operating system?
- 1.2) Explain the functions of programmer's view and system's view in an operating system.
- 1.3) Draw the *process state transition* diagram of an operating system and describe it.
- 1.4) Compare and contrast *Real time operating systems* and *Time-Sharing systems*.

QUESTION 2

- 2.1) List and briefly explain the different types of process termination.
- 2.2) 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	7
2	2	5
3	3	2
4	5	1
5	7	3
6	10	2

- (i) Draw separate Gantt charts illustrating the above jobs using **Non pre-emptive SJF, Pre-emptive SJF and Round Robin (time quanta = 2)** scheduling algorithms.
- (ii) Compute the *average turn around time, average waiting time and average response time* for above jobs using **pre-emptive SJF algorithm**. Show all the calculations.

QUESTION 3

- 3.1) List **five (5)** fields of process control block (PCB).
- 3.2) Briefly describe what is *race condition* in operating system?
- 3.3) List **four (4)** types of message passing primitives in inter-process communication.
- 3.4) Explain **five (5)** major factors affecting scheduling decisions in an operating system.
- 3.5) Compare *kernel threads and user threads*.

QUESTION 4

- 4.1) Explain **two (2)** types of free memory management schemes in an operating system.
- 4.2) Compare *first fit* and *best fit* memory allocation schemes?
- 4.3) Suppose you have the following page reference string and the frames (0,1,2).

Reference string	2	4	3	4	2	3	3	4	2	3	6	4	3	6	2	1
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) Assume that the operating system on your computer uses the buddy system for memory management. Initially the system has 8192 KB of memory, which begins at address 0. Show the result of each request/release given below via successive figures.

- | | |
|---------------------|----------------------|
| 1. A: Request 700KB | 7. Release B |
| 2. B: Request 650KB | 8. F: Request 100 KB |
| 3. C: Request 415KB | 9. Release C |
| 4. D: Request 230KB | 10. Release D |
| 5. E: Request 125KB | 11. Release E |
| 6. Release A | 12. Release F |

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

QUESTION 5

- 5.1) Draw a simple diagram to illustrate a deadlocked system.
- 5.2) List **four (4)** necessary conditions for a deadlock to occur.
- 5.3) Explain **two (2)** mechanisms of recovering from a deadlock.
- 5.4) In a System, there is a total of 26 units of resource R1, 18 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	8	8	4	3	3	2
P1	11	7	5	7	4	5
P2	7	5	7	7	4	3
P3	8	6	3	6	1	1

- (i) Show that the above state (S0) is a safe state. Give the complete sequence of jobs.
- (ii) The process P1 requests for the resources (R1, R2, R3) equivalent to units (1, 0, 1) when the system is in state S0. Is it possible to grant the request by P1? Give the process sequence.

QUESTION 6

- 6.1). Compare *Raid 0* and *Raid 1* disk management schemes?
- 6.2) Permission numbers of files janitha.txt and pasan.txt are given as 653, 542 respectively.
- (i) Explain the permissions of those files in terms of owner, group and others.
 - (ii) Which file has the most permissions for the owner?
- 6.3) List **four (4)** different file types that can exist in an operating system with their functions.
- 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 345 and 150 respectively. The read request sequence is 300, 220, 500, 60, 180, 650, 700. Then calculate the distance traveled by disk head in each of the scheduling algorithm given below from the current head position.
- (i) C-SCAN
 - (ii) C-LOOK
 - (iii) LOOK
 - (iv) SSTF

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