

## C0-R4.B2: OPERATING SYSTEMS

### NOTE:

1. Answer question 1 and any FOUR from questions 2 to 7.
2. Parts of the same question should be answered together and in the same sequence.

Time: 3 Hours

Total Marks: 100

1.
  - a) Differentiate between tightly coupled systems and loosely coupled systems.
  - b) Differentiate between Multitasking and Multiprogramming systems.
  - c) Differentiate between Process and thread.
  - d) Differentiate between Pre-emptive and Non-preemptive scheduling algorithms.
  - e) What are the four main modules of an Operating System?
  - f) What is an access control list? How is it used to secure data for the users?
  - g) What is compaction in the context of variable-sized partition memory management scheme?  
(7x4)
  
2. Consider the following resource allocation matrix of a system:

<i>Process</i>	<i>Allocation</i>	<i>Max</i>	<i>Available</i>
	<i>A B C D</i>	<i>A B C D</i>	<i>A B C D</i>
<i>P0</i>	0 0 1 2	0 0 1 2	1 5 2 0
<i>P1</i>	1 0 0 0	1 7 5 0	
<i>P2</i>	1 3 5 4	2 3 5 6	
<i>P3</i>	0 6 3 2	0 6 5 2	
<i>P4</i>	0 0 1 4	0 6 5 6	

Answer the following question using the banker's algorithm:

  - a) What is the content of the matrix *Need*? Is the system in a safe state?
  - b) What is a Process Control Block? List and explain 5 (five) fields of PCB.  
(9+9)
  
3. Consider the following page reference string:  
1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6.  
How many page faults would occur for the following replacement algorithms, assuming three physical frames? Repeat the exercise for seven frames. Remember all frames are initially empty, so your first unique pages will all cost one fault each.
  - a) LRU replacement
  - b) FIFO replacement
  - c) Optimal replacement  
(6+6+6)
  
4. Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests, in FIFO order, is  
86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130  
Starting from the current head position, what is the total distance ((in cylinders) that the disk arm moves to satisfy all the pending requests, for each of the following disk scheduling algorithms,
  - a) FCFS
  - b) SSTF
  - c) SCAN  
(6+6+6)

5. Consider the following set of processes, with the length of the CPU-burst time given in milliseconds:

	Process	Burst Time
1.	<i>P1</i>	10
2.	<i>P2</i>	1
3.	<i>P3</i>	2
4.	<i>P4</i>	4
5.	<i>P5</i>	5

All the processes are assumed to have arrived at time 0.

- a) Draw Gantt charts illustrating the execution of these processes using FCFS, Round-Robin and SJF algorithms.
- b) What is the turnaround time of each process for each of the scheduling algorithms in **Part a)**?
- c) What is the waiting time of each process for each of the scheduling algorithms in **Part a)**?  
(6+6+6)

6.

- a) What is the difference between paging and segmentation? List in points.
- b) What is thrashing? Explain with the help of an example.
- c) How is storage allocated on the disk using bit map?  
(6+6+6)

7. Write short notes on **any three** of the followings:

- a) Device Drivers
- b) File Allocation Methods
- c) Critical Section Problem
- d) Distributed File System
- e) Direct Memory Access  
(6+6+6)