

2056
B.E. (Information Technology)
Fourth Semester
PCIT-403: Operating System

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Part.

x-x-x

1. Define the followings:

(2 X 5 = 10)

- Multiprogramming
- System call
- Demand Paging
- Process Migration
- Rotational Latency

PART - A

2. A distributed cloud storage system contains multiple virtual machines competing for shared resources such as printers, storage locks, and database connections.

- Explain the necessary conditions for deadlock to occur in such a system.
- Using a suitable example, illustrate how a Resource Allocation Graph (RAG) can be used to detect deadlock situations. Explain how cycles in the graph help determine whether the system is deadlocked.
- In the following system:

	MAX NEED			ALLOCATION				RESOURCE DETAILS		
	R1	R2	R3	R1	R2	R3		R1	R2	R3
P1	3	6	8	2	2	3	Total Allocated	5	4	10
P2	4	3	3	2	0	3				
P3	3	4	4	1	2	4	Total Exist	7	7	10

Using the Banker's Algorithm, determine whether the current state is safe. If safe, identify the safe sequence. Would an additional request from process P1 (1,1,0) be granted in current state or not?
(2+3+5)

3. a) An online ticket reservation system allows multiple clients to simultaneously access and update seat booking records stored in shared memory.

- Explain the concept of process synchronization in the context of this system.
- Explain how semaphores can be used to ensure mutual exclusion while updating booking information.

b) Discuss the contents of a Process Control Block (PCB) and explain how PCB supports process management and scheduling.
(5+5)

(2)

4. a) Assuming main memory to be 400 bytes and page size 100 bytes, using Least Frequently Used algorithm for page replacement, calculate the number of page faults for following sequence of page references:

4, 8, 2, 3, 2, 8, 3, 1, 2, 6, 7

(5)

- b) A server-class computer system uses paging for memory management. The physical memory size is 2 GB and page size is 8 KB. The logical address space of each process is restricted to 256 MB.

(1+1+1+2)

- (i) Determine the total number of bits in the physical address.
- (ii) Determine the number of page frames.
- (iii) Determine the number of bits in logical address.
- (iv) What will be the size of page table if one entry of page table required 2 bytes.

PART – B

5. Discuss the layout of UNIX file system. What is the layout of i-node? How does the path name get translated to i-node number. (10)

6. A cloud storage server contains 1000 cylinders numbered from 0 to 999. The disk head is currently positioned at cylinder 350. The pending request queue is:

89, 450, 813, 276, 438, 149, 112, 750, 330.

Starting from the current head position, what is the total distance that disk arm moves to satisfy all pending requests, for each of the following disk scheduling algorithm? Compare the algorithms in terms of seek efficiency, response time, and starvation possibility. (Show in graph also)

- a) FCFS
- b) SSTF
- c) C-LOOK
- d) C-SCAN

(10)

7. Write short note on any two of the followings:

- a) File Allocation Methods
- b) Network Operating System
- c) Cache updation techniques

(10)

x-x-x