


VIT

Vellore Institute of Technology

Final Assessment Test – November 2025

Course: UBCA106L - Operating Systems

Class NBR(s): 2796

Time: Three Hours

Slot: C2+TC2

Max. Marks: 100

- KEEPING MOBILE PHONE/ANY ELECTRONIC GADGETS, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE
- DON'T WRITE ANYTHING ON THE QUESTION PAPER

COs	CO Statements
CO1	Understand the services and functionalities of operating system with process and thread creation mechanism
CO2	Explore synchronization mechanism and providing solutions to critical sections
CO3	Apply various Process Scheduling algorithm to improve CPU utilization and throughput
CO4	Categorize various physical/virtual memory management techniques to optimize the memory allocation process
CO5	Inspect various disk scheduling algorithms and file management Approaches

BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)

Answer ALL Questions

(10 X 10 = 100 Marks)

1. Critically evaluate how variations in storage hierarchy design influence the throughput, responsiveness, and resource management efficiency of an operating system within a modern computer architecture. CO1 BL4
2. Compare and contrast system calls and system functions, highlighting their roles, execution mechanisms, and impact on system performance. CO1 BL2
3. Justify the necessity of maintaining a separate Process Control Block (PCB) for every process and elaborate on the role and significance of various process states, illustrating your answer with a suitable diagram. CO1 BL4
4. Justify the importance of interprocess communication and distinguish between direct and indirect communication methods, highlighting their advantages and limitations. CO1 BL4
5. Explain the concept of a critical section in process synchronization. Why is it important to protect critical sections in a multitasking operating system? Illustrate your explanation with suitable algorithms and code examples. CO2 BL3

6. In a shared file management system, multiple processes attempt to read from and write to the same file concurrently. Suppose there are 6 reader processes and 2 writer processes competing for access. Will this situation cause issues in maintaining data consistency? If your answer is 'no,' justify your reasoning. If your answer is 'yes,' discuss the possible issues from both the readers' and writers' perspectives, and propose an algorithmic solution to ensure data integrity. CO2 BL3
7. Discuss the significance of the LRU page replacement algorithm. Solve the following problem using LRU and mention the number of page references, number of page faults, number of hits, and the last frame composition. CO4 BL3
- Reference string:**
- 4, 1, 2, 4, 3, 2, 1, 5, 4, 2
- Frames = 3**
8. Explain disk structure and discuss different disk scheduling algorithms. CO5 BL2
- 9.a) Compare and contrast priority scheduling in preemptive and non-preemptive methods of allocation. Discuss the merits and demerits of each method along with their real time application. CO3 BL4

OR

- 9.b) Compare and contrast FCFS and SJF scheduling algorithms. Discuss the merits and demerits of each method along with their real time application. CO3 BL4
- 10.a) Compare and contrast the First-Fit and Worst-Fit memory allocation strategies. Using the memory blocks below (B1...B8) and processes (in arrival order P1...P6), perform memory allocation according to First-Fit and Worst-Fit and show the difference between two strategies CO4 BL4
- Memory blocks (in order B1..B8):**
- B1 = 120, B2 = 500, B3 = 260, B4 = 300, B5 = 700, B6 = 350, B7 = 220, B8 = 400
- Processes (arrival/allocation order P1..P6):**
- P1 = 425, P2 = 215, P3 = 110, P4 = 430, P5 = 95, P6 = 360
- OR**
- 10.b) "Paging is superior to segmentation as it does not cause the issue of external fragmentation." — Justify this statement in detail. CO4 BL4

X/K/TY