

CS405 Operating Systems – Unit 4 PYQ Analysis (2022–2025)

Unit 4 Syllabus

Input / Output

- Principles and Programming
- Input/Output Problems
- Asynchronous Operations
- Speed Gap & Format Conversion
- I/O Interfaces
- Program Controlled I/O
- Interrupt Driven I/O
- Concurrent I/O

Concurrent Processes

- Real & Virtual Concurrency
- Mutual Exclusion
- Synchronization
- Inter Process Communication (IPC)
- Critical Section Problem
- Semaphores
 - Binary Semaphore
 - Counting Semaphore
- WAIT & SIGNAL Operations
- Deadlocks
 - Characterization
 - Prevention
 - Avoidance
 - Recovery

Exact PYQs Related to Unit 4

Year	Question
June 2025	Explain Polling and Interrupt Driven I/O.
June 2025	What is DMA? Explain its working.
June 2025	Explain Deadlock Recovery.
Dec 2024	Explain Inter Process Communication (IPC).
Dec 2024	Explain Deadlock Prevention and Avoidance.
June 2024	What is Mutual Exclusion? Explain.
June 2024	Explain Dining Philosopher Problem.
June 2024	Explain Reader Writer Problem.
Nov 2023	Explain Semaphore and its types.
Nov 2023	Explain WAIT and SIGNAL operations.
Nov 2023	Explain Deadlock and its Characterization.
Nov 2023	Explain Resource Allocation Graph.
June 2023	Explain Critical Section Problem.
June 2023	Conditions required for Critical Section Solution.
June 2023	Explain Binary Semaphore and Counting Semaphore.
Nov 2022	Explain Synchronization and Mutual Exclusion.
Nov 2022	Explain Deadlock Prevention Techniques.
June 2022	Explain Kernel I/O Subsystem.
June 2022	Explain I/O Buffering.

June 2022	Explain Critical Section Problem.
June 2022	Explain Binary and Counting Semaphore.

Topic-wise PYQ Mapping

INPUT / OUTPUT SECTION

1. Principles of I/O

PYQs

June 2022

- Kernel I/O Subsystem

Frequency



2. Input / Output Problems

PYQs

Indirectly asked through:

- I/O Buffering
- DMA
- Interrupt Driven I/O

Frequency



3. Asynchronous Operations

PYQs

Indirectly asked in:

- Interrupt Driven I/O
- Concurrent I/O

Frequency



4. Speed Gap & Format Conversion

PYQs

Indirectly covered in:

- I/O Buffering
- DMA

Frequency



5. I/O Interfaces

PYQs

June 2022

- Kernel I/O Subsystem

Frequency



6. Program Controlled I/O

PYQs

June 2025

- Polling Method

Frequency



7. Interrupt Driven I/O

PYQs

June 2025

- Explain Interrupt Driven I/O.

Frequency



8. Concurrent I/O

PYQs

Indirectly covered.

Frequency



CONCURRENT PROCESS SECTION

9. Real & Virtual Concurrency

PYQs

Indirectly included in:

- Synchronization
- IPC

Frequency



10. Mutual Exclusion

PYQs

Nov 2022

- Explain Mutual Exclusion.

June 2024

- What is Mutual Exclusion?

Frequency



11. Synchronization

PYQs

Nov 2022

- Explain Synchronization.

Frequency



12. Inter Process Communication (IPC)

PYQs

Dec 2024

- Explain IPC.

Frequency



13. Critical Section Problem

PYQs

June 2022

- Explain Critical Section Problem.

June 2023

- Explain Critical Section Problem.

June 2023

- Conditions for Critical Section Solution.

Frequency

★★★★★ MOST REPEATED

14. Semaphores

PYQs

June 2022

- Binary Semaphore
- Counting Semaphore

June 2023

- Binary Semaphore
- Counting Semaphore

Nov 2023

- Explain Semaphore and its types.

Frequency

★★★★★ MOST REPEATED

15. WAIT & SIGNAL

PYQs

Nov 2023

- Explain WAIT and SIGNAL Operations.

Frequency



16. Deadlock

PYQs

Nov 2023

- Deadlock Characterization

Nov 2022

- Deadlock Prevention

Dec 2024

- Deadlock Prevention & Avoidance

June 2025

- Deadlock Recovery

Frequency



17. Resource Allocation Graph

PYQs

Nov 2023

- Resource Allocation Graph.

Frequency



18. Dining Philosopher Problem

PYQs

June 2024

- Dining Philosopher Problem.

Frequency



19. Reader Writer Problem

PYQs

June 2024

- Reader Writer Problem.

Frequency



Most Repeated Questions

★★★★★ Critical Section Problem

Appeared:

- June 2022
- June 2023

Questions:

- Explain Critical Section Problem.
 - Conditions for Solution.
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★★★★★ Semaphore

Appeared:

- June 2022
- June 2023
- Nov 2023

Questions:

- Binary Semaphore
 - Counting Semaphore
 - Semaphore Types
-

★★★★★ Deadlock

Appeared:

- Nov 2022
- Nov 2023
- Dec 2024
- June 2025

Questions:

- Characterization
 - Prevention
 - Avoidance
 - Recovery
-

 **Mutual Exclusion**

Appeared:

- Nov 2022
 - June 2024
-

 **WAIT & SIGNAL**

Appeared:

- Nov 2023
-

 **IPC**

Appeared:

- Dec 2024