## L2 Synchronization

## 1. Which condition is NOT required for deadlock?

A) Mutual exclusion  
B) Hold-and-wait  
C) Starvation  
D) Circular wait  
**Answer:** C) Starvation  
Explanation: Starvation is a separate concept, not one of the four deadlock conditions1.

## 2. In a resource-allocation graph (RAG), a deadlock is certain if:

A) There is a cycle and all resources have multiple instances  
B) There is no cycle  
C) There is a cycle and all resources have single instances  
D) A thread requests two resources simultaneously  
**Answer:** C) There is a cycle and all resources have single instances1.

## 3. The Banker’s algorithm is primarily used for:

A) Deadlock prevention  
B) Deadlock detection  
C) Deadlock avoidance  
D) Deadlock recovery  
**Answer:** C) Deadlock avoidance.

## 4. Spooling helps prevent deadlocks by addressing which condition?

A) Hold-and-wait  
B) Mutual exclusion  
C) Circular wait  
D) No preemption  
**Answer:** B) Mutual exclusion  
Explanation: Spooling uses a daemon to manage resources like printers, eliminating direct mutual exclusion between processes1[8](https://www.sanfoundry.com/operating-system-questions-answers-deadlock/).

## 5. In the Dining Philosophers problem, deadlock can be prevented by:

A) Allowing philosophers to take forks in any order  
B) Using the Ostrich algorithm  
C) Ensuring one philosopher picks up forks in reverse order  
D) Adding more philosophers  
**Answer:** C) Ensuring one philosopher picks up forks in reverse order.

## 6. The Ostrich algorithm involves:

A) Preempting resources from low-priority threads  
B) Ignoring the possibility of deadlock  
C) Rolling back thread execution  
D) Forcing resource ordering  
**Answer:** B) Ignoring the possibility of deadlock.

## 7. A system is in a safe state if:

A) All resources are fully allocated  
B) There exists a sequence where all threads can complete  
C) No circular wait exists  
D) Resources are preemptible  
**Answer:** B) There exists a sequence where all threads can complete.

## 8. Which technique addresses "mutual exclusion"?

A) Spooling  
B) Requesting resources in order  
C) Banker’s algorithm  
D) Preemption  
**Answer:** A) Spooling.

## 9. Starvation differs from deadlock because:

A) Starvation always resolves itself  
B) Deadlock involves circular waiting  
C) Starvation cannot occur in priority-based systems  
D) Deadlock requires external intervention  
**Answer:** B) Deadlock involves circular waiting.

## 10. A deadlock recovery method is:

A) Rolling back threads to checkpoints  
B) Using dimension ordering  
C) Implementing spooling  
D) Enforcing resource ordering  
**Answer:** A) Rolling back threads to checkpoints.

## 11. In the train analogy, deadlock is resolved using:

A) Preemption  
B) Dimension ordering (X then Y)  
C) Spooling  
D) Random backtracking  
**Answer:** B) Dimension ordering (X then Y).

## 12. The Multi-Armed Lawyers problem models resources as:

A) Individual forks  
B) A single pool of chopsticks  
C) Priority-based allocations  
D) Preemptible printers  
**Answer:** B) A single pool of chopsticks.

## 13. A communication deadlock occurs when:

A) Threads wait for shared resources  
B) Messages are lost in a network  
C) Resources are non-preemptible  
D) Circular waits form  
**Answer:** B) Messages are lost in a network.

## 14. Which is true about the Banker’s algorithm?

A) It requires threads to declare maximum resource needs  
B) It detects existing deadlocks  
C) It prioritizes low-resource threads  
D) It uses spooling for printers  
**Answer:** A) It requires threads to declare maximum resource needs.

## 15. In a Research Allocation Graph (RAG) with a cycle and multi-instance resources:

A) Deadlock is certain  
B) Deadlock is impossible  
C) Deadlock is possible but not guaranteed  
D) Starvation must occur  
**Answer:** C) Deadlock is possible but not guaranteed.

## 16. In Banker's algorithm, an unsafe state indicates:

A) Immediate deadlock occurrence  
B) Potential for future deadlock if resources are allocated  
C) All processes have exceeded their maximum claims  
D) System must preempt resources immediately  
**Answer:** B) Potential for future deadlock if resources are allocated  
Explanation: An unsafe state means no guaranteed completion sequence exists, but deadlock isn't yet present.

## 17. The Multi-Armed Lawyers problem differs from the Dining Philosophers problem because it models resources as:

A) Fixed-position forks  
B) A shared pool of identical chopsticks  
C) Priority-based allocations  
D) Preemptible printers  
**Answer:** B) A shared pool of identical chopsticks  
Explanation: Resources are centralized (single pool) rather than fixed between pairs, requiring different avoidance strategies.