1. A deadlocked state occurs whenever (C).

A) a process is waiting for I/O to a device that does not exist

B) the system has no available free resources

C) every process in a set is waiting for an event that can only be caused by another process in the set

D) a process is unable to release its request for a resource after use

2. One necessary condition for deadlock is (B), which states that at least one resource must be held in a nonsharable mode.

A) hold and wait B) mutual exclusion

C) circular wait D) no preemption

3. A cycle in a resource-allocation graph is (B).

A) a necessary and sufficient condition for deadlock in the case that each resource has more than one instance

B) a necessary and sufficient condition for a deadlock in the case that each resource has exactly one instance

C) a sufficient condition for a deadlock in the case that each resource has more than once instance

D) is neither necessary nor sufficient for indicating deadlock in the case that each resource has exactly one instance

4. To handle deadlocks, operating systems most often (A).

A) pretend（假装） that deadlocks never occur
B) use protocols to prevent or avoid deadlocks
C) detect and recover from deadlocks
D) None of the above

5. Which of the following statements is true? (D)

A) A safe state is a deadlocked state.
B) A safe state may lead to a deadlocked state.
C) An unsafe state is necessarily, and by definition, always a deadlocked state.
D) An unsafe state may lead to a deadlocked state.

6. Suppose that there are ten resources available to three processes. At time 0, the following data is collected. The table indicates the process, the maximum number of resources needed by the process, and the number of resources currently owned by each process. Which of the following correctly characterizes this state? (B)

Process	Maximum Needs	Currently Owned
P0	10	4
P1	3	1
P2	6	4

A) It is safe.
B) It is not safe.
C) The state cannot be determined.
D) It is an impossible state.

7. Assume there are three resources, R_1, R_2, and R_3, that are each assigned unique integer values 15, 10, and 25, respectively. What is a resource ordering which prevents a circular wait? (D)

A) R_1, R_2, R_3 B) R_3, R_2, R_1 C) R_3, R_1, R_2 D) R_2, R_1, R_3

8. A (B) could be preempted from a process.

A) mutex lock B) CPU C) semaphore D) file lock

9. (T) The wait-for graph scheme is not applicable to a resource allocation system with multiple instances of each resource type.

10. (T) The banker's algorithm is useful in a system with multiple instances of each resource type.

11. (F) Deadlock prevention and deadlock avoidance are essentially the same approaches for handling deadlock.

12. What is the difference between deadlock prevention and deadlock avoidance?

Ans. Deadlock prevention is a set of methods for ensuring that at least one of the necessary conditions for deadlock cannot hold. Deadlock avoidance requires that the operating system be given, in advance, additional information concerning which resources a process will request and use during its lifetime.

13. Describe the four conditions that must hold simultaneously in a system if a deadlock is to occur.

Ans. For a set of processes to be deadlocked: at least one resource must remain in a nonsharable mode, a process must hold at least one resource and be waiting to acquire additional resources held by other processes, resources in the system cannot be preempted, and a circular wait has to exist between processes.