List of the Possible Questions

#1: What is “process deadlock”? How is it different from “process starvation”?

#2: If more than one mutex (binary) semaphore is used, can process deadlock occur? If no, explain why not. If yes, explain how using an example.

#3: Why is it difficult to eliminate the condition of “hold & wait” (by applying “request all after you drop what all you currently hold” method) to prevent a process deadlock from occurring?

#4: Why is it difficult to eliminate the condition of “mutual exclusion” to prevent a process deadlock from occurring?

#5: Why is it difficult to eliminate the condition of “non preemptive resources” to prevent a process deadlock from occurring?

#6: Why is it difficult to eliminate the condition of “hold & wait” (by applying “request all after you drop what all you currently hold” method) to prevent a process deadlock from occurring?

The only way to prevent “hold and wait” is by the following method:

If a process that holds some non-preemptive resources needs additional resource(s), the process must release all the resources it currently holds and then it requests all the resources (both what it has released and what it additionally needs).

However, this method cause process starvation especially to the processes that need many resources (i.e., the processes that need a small number of resources almost always have a chance to use those resources needed by processes that need a large number of resources).

#7: Which of the following sentence is the correct definition of “safe state” in deadlock avoidance (select the best option)?

(a) From the current state, deadlock can happen, if some process(es) can not finish.
(b) From the current state, there is at least one particular way that lets all the processes complete without causing a deadlock.
(c) The deadlock has already happened.
(d) If deadlock has not happened yet that is a safe state.
(e) None of the above

#8: Why is it difficult to eliminate the condition of “circular wait” (by applying “assign resource IDS and require all processes to make requests in the ascending or the descending order” method) to prevent a process deadlock from occurring?

This question has been dropped.
#9: What are the two states in “deadlock avoidance”?  

#10: In deadlock prevention, one of the solutions is not to allow any process to “hold & wait” (if a process that holds some non-preemptive resources needs additional resource(s), the process must release all the resources it currently holds and then it requests all the resources (both what it has released and what it additionally needs). Explain how this will prevent deadlocks.

Since each process must drop all resources it currently holds before the process requests other resources and since each process can get all resources if all of them are available (i.e., if one of the resources a process requests is not available, the process can not get any other resources (even if they are available)), no process can bot wait for any resources while the same process holds some resources. Thus, process deadlock can not occur, if all resources obey this rule.

#11: In the classroom, we discussed what we can do to make sure one of the four necessary conditions for a deadlock is not satisfied. Is it possible to have a technique that never causes “circular wait” (other than “all or nothing approach”)? If yes, describe how.

Yes, it is possible.

Circular-wait can be prevented, by first assigning a unique resource ID to every resource and then by forcing all processes to make request either in the ascending order of the resource ID or in the descending order of their IDs.

#12: For the following situations, which one is (are) in deadlock?

In the above figures, Ri = Resource, Pi = Process, a directional edge from R to P is assignment and a directional edge from P to R is a blocked request (one edge for one resource). You don’t need to describe anything. If none of the three is in deadlock, clearly mention so. If the same resource is assigned to more than one process, it means that more than one instance of the resource are available.