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Note: Please write your answer(s) according to your understanding, no copy from books or internet.
Copy will result in minus scores. Explain your choice will get you bonus score.

MIDTERM EXAM

Close Exam
120 minutes

1. Give definition to these terms: Deadlock, Livelock and Starvation with one example each term.

   - Deadlock: a problem occurring when the resources needed by some jobs to finish execution are held by other jobs, which, in turn, are waiting for other resources to become available. The deadlock is complete if the remainder of the system comes to a stand- still as a result of the hold the processes have on the resource allocation scheme.
   - Livelock: a locked system whereby two or more processes continually block the forward progress of the others without making any forward progress itself. It is similar to a deadlock except that neither process is blocked or waiting; they are both in a continuous state of change.
   - Starvation: the result of conservative allocation of resources in which a single job is prevented from execution because it is kept waiting for resources that never become available. It is an extreme case of indefinite postponement.

2. What are the necessary conditions for deadlock to occur? Explain each condition.
   - File requests: Jobs request and hold files for execution duration
   - Databases: Two processes access and lock database records
   - Dedicated device allocation: Limited number of dedicated devices
   - Multiple device allocation: Several processes request & hold dedicated devices
   - Spooling: handles incoming jobs or transfers files over a network
   - Network: No network protocols controlling network message flow
   - Disk sharing: Competing processes send conflicting commands.

3. A mobile system has 4 applications, and each application needs two units of cameras. What is

the minimum number of camera needed by this system in order to avoid a deadlock? Explain your choice.

a. 5 (minimum to avoid a deadlock = (each application unit – 1) + 1 = ((2-1)*4) + 1 = 5)

4. An operating system has 5 unique resources and n processes competing for them. Each process can request at most 2 resources. Which one of the following values of n could lead to a deadlock?
   d. 4 (number of resource >= number of process(max process – 1) + 1 so 5 >= N (2 – 1) + 1 thus 4 >= N)

5. Which of the following is not true about deadlock prevention scheme?
   c. Never request a resource after releasing any resource.

6. A system has N number of same type resources. These resources are shared by 3 jobs X, Y, Z which have demands of 4, 5, 7 respectively to complete their tasks. What is the minimum number of N that guarantee system deadlock free?
   c. 14 (N >= (each job – 1) + 1 so N >= ((4-1) + (5-1) + (7-1)) + 1 >= 14)

7. In which of the following four necessary conditions for deadlock processes claim exclusive control of the resources they require?
   b. Mutual Exclusion

8. What problem is solved by Banker's algorithm?
   d. Deadlock Avoidance

9. D. Not Safe, Not Deadlocked

10. D. Neither Request 1 and Request 2 can be allowed.