Operating System Assignment

1. Explain the necessary conditions that may lead to a deadlock situation.

2. What are the various methods for handling deadlocks?

3. Is it possible to have a deadlock involving only one single process? Explain your answer.

4. Consider a system consisting of 4 resources of the same type that are shared by 3 processes, each of which needs at most 2 resources. Show that the system is deadlock free.

5. What is a resource allocation graph? How do you obtain a wait-for graph from it? Explain their uses.

6. Can a system detect that some of its processes are starving? If you answer "yes," explain how it can. If you answer "no," explain how the system can deal with the starvation problem.

7. Consider the following snapshot of a system:

	Allocation	*Max*	*Available*
	A B C D	*A B C D*	*A B C D*
*P*0	0 0 1 2	0 0 1 2	1 5 2 0
*P*1	1 0 0 0	1 7 5 0	
*P*2	1 3 5 4	2 3 5 6	
*P*3	0 6 3 2	0 6 5 2	
*P*4	0 0 1 4	0 6 5 6	

Answer the following questions using the banker's algorithm:

a. What is the content of the matrix Need?

b. Is the system in a safe state?

c. If a request from process P1 arrives for (0,4,2,0), can the request be granted immediately?

8. What is the meaning of the term busy waiting? What other kinds of waiting are there in an operating system? Can busy waiting be avoided altogether? Explain your answer.
9. Differentiate between shared and dedicated devices.

10. Differentiate between deadlock and starvation.

11. What is critical section problem? What are the requirements that a solution to critical section problem must satisfy?

12. What is monitor? How is it used to access critical section?

13. What do you mean by process synchronization? Why is it required?

14. On a disk with 1000 cylinders, number 0 to 999, compute the number of tracks the disk arm must move to satisfy all the requests in the disk queue. Assume the last request serviced was at track 345 and the head is moving toward track 0. The queue in FIFO order contains requests for the following tracks: 123, 847, 692, 475, 105, 376. Perform the computations for the following disk scheduling algorithms:

FCFS
SSTF
SCAN
C-SCAN
LOOK

15. Define the following:

i) Buffering
ii) RAID
iii) Direct Memory Access
iv) Resource Allocation Graph
v) Wait & Signal Operation
vi) Semaphores
vii) Race Condition.