1.

A semaphore is initialized to the number of allowable open socket connections.When a connection is accepted, the acquire()method is called, when a connection is released, the release() method is called. If the system reaches the number of allowable socket connections, subsequent calls to acquire() will block until an existing connection is terminated and the release method is invoked.

2.

Because the user level programs have an ability to disable the interrupts. So the program can disable the timer interrupt and prevent the context switching. Then the program can use the processor without allowing other processes to execute.

3.

i. yes, this system is in a safe state.

Safe sequence = <C,A,D,B>

ii. Yes. Total resources of the system is 10. After process D arrives for 1 resource,

the available resources become 1. So we can complete a safe sequence by using one available resource. Then the safe sequence becomes <C,A,D,B>

4.

i. 64

ii. 20

iii.  Yes. there is an internal fragmentation.

If memory is slightly larger than the requested memory, we call there is an internal fragmentation

User program requested memory size = 20000 bytes

Memory size         =  20 \* 2^10

        = 20480 bytes

Difference         = 20480 - 20000

        = 480 bytes

According to the above calculation, memory size is slightly larger than the requested memory size. So, there is an internal fragmentation.