Operating System

(Questions must be answered with explanations, a simple “yes” or “no” does not help the credits)

1. (10%) Memory can be used either as a RAM disk or as a disk cache. Give situations that in favor each one against another.
2. (15%) Given a UNIX file system with 1-KB blocks and 4-bytes disk address. What is the maximum file size if i-node contains 10 direct entries, and one single, one double, and one triple indirect entry respectively?
3. (15%) The page size is critical to the performance of a paging system, list two factors which suggest bigger page size, and two factors for smaller size.
4. (15%) There are k identical hardware decoders shared by n decoding processes, and $k < n$. Once the decoder is assigned to a specific process, it is dedicated to that process and cannot service others. Please write down the code of decoding processes which employs a semaphore to control the request and release operation of decoders.
5. (15%) Please describe and compare the context switching happened at the following three different levels: process-level, user-thread level, and kernel-thread level.
6. (10%) During the operations, the kernel itself may request memory as user process does. However, kernel memory is usually allocated from a pool different from the one used by user process, why is that?
7. (20%) Please explain the following terms. (a)thrashing (b)translation look-aside buffer (c)hard real-time operating system (d)remote method invocation (e)dirty bit