(1) What are the two primary roles of operating systems?

- Operating systems as *middlemen* between high-level commands (human users or user applications) or operating systems as *extended machines* (+5 points)
- Operating systems as *government* for system resources in a computer systems or operating systems as *resource managers* (+5 points)

(2) What is “context switching”?

*The context switching is the act of switching a processor from one program (process) to another by saving the processor registers of the current process to the stack and loading the processor registers of the next process from the stack.*

(3) What is “batch system”? Show how a computer host with a typical batch is organized.

*Batch systems are computer systems that have “a program loader”. Human users can submit multiple programs to the program loader and the program loader executes the submitted program one after another (so that it is not necessary for human users to always attend a computer system and monitor the progress of his/her program execution).*
(4) What are the two primary problems in batch system?

- Low processor utilization (+5 points)
- Programs that crash because of their software bugs are automatically kicked out and they need to be re-submitted to the program loader after their bugs are fixed (by human programmers) (+5 points)

(5) What does “degree of multitasking” mean?

The term, “degree of multitasking” means the number of programs (processes) a multitasking OS loads to the main memory at a time. If “the degree of multitasking” is too low, the system’s processor utilization will be low.