(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 are “multi-tasking systems”?

Multi-tasking systems are computer systems, where multiple processes are loaded to the main memory and a processor is switched (context-switched) one program (process) to another in short time so that it provides an illusion of those multiple programs (processes) as if they were are running physically at the same time.

(3) What is “extended machine”? This question does not ask how we can use extended machine. A definition of “extended machine” is needed.

An imaginary computer (as a hardware computer) that can be manipulated directly by high-level user commands by abstraction offered by an operating system.
(4) What problem in “batch system” do “multi-programming (multitasking) OSes” fix and how?

   The problem multitasking OSes fix is “low processor utilization*”.

*: Since batch systems execute one program at a time, its processor utilization is usually low (as we discussed in the classroom.

Note: “the capability to fix bugs after a program crashes by a software bus” is not the problem “multitasking OS” fixes. It is the problem “timesharing systems (timesharing multitasking OSes) fix.

(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.