* **8.1 What is an operating system?**

An operating system (OS) is a program that controls the execution of application programs and acts as an interface between applications and the computer hardware.

* **8.2 List and briefly define the key services provided by an OS.**
* Program creation: It provides a variety of facilities and services, such as editors and debuggers, to assist the programmer in creating programs.
* Program execution: OS handles such things as loading instructions and data into memory, and initialization of I/O devices and files.
* Access to I/O devices: OS takes care of the details involved with I/O device operation (providing the required specific sets of instructions or control signals required for operation).
* Controlled access to files: OS worries about the details involved such as understanding the nature of the I/O device and also the file format on the storage medium.
* System access: It provides protections of resources and data from unauthorized users and also resolves conflicts for resource contention.
* Error detection and response: The OS must take the response that clears error conditions with the least impact on running applications.
* Accounting: Good OS collects usage statistics for various resources and monitors performance parameters such as response time.
* **8.3 List and briefly define the major types of OS scheduling.**
* Long-term scheduling: The long-term scheduler determines which programs are admitted to the system for processes. It controls the degress of multiprogramming.
* Medium-term scheduling: This is part of the swapping section. Typically, the swapping-in decision is based on the need to manage the degree of multiprogramming. Determines whether to add to the number of processes that are partially or fully in main memory.
* Short-term scheduling: Also known as the dispatcher. Executes frequently and makes the fine-grained decision of which job to execute next.
* I/O scheduling: The decision as to which process’s pending I/O request shall be handled by an available I/O device.
* **8.4 What is the difference between a process and a program?**
* Program: executable file stored in external memory.
* Process: program in execution.
* **8.5 What is the purpose of swapping?**

The purpose of swapping is to keep memory free for processes that are running at the moment. It allows temporarily removing processes not in a ready state to replace with processes in a ready state.

* **8.6 If a process may be dynamically assigned to different locations in main memory, what is the implication for the addressing mechanism?**

The addressing mechanism must keep track of the physical addresses of the process, as well as the logical addresses used for swapping out the process.

* **8.7 Is it necessary for all of the pages of a process to be in main memory while the process is executing?**

No, only the pages containing the parts of the process that is executing.

* **8.8 Must the pages of a process in main memory be contiguous?**

No.

* **8.9 Is it necessary for the pages of a process in main memory to be in sequential order?**

No.

* **8.10 What is the purpose of a translation lookaside buffer?**

It is a special cache for page table entries, to cut down on memory access time, to cut down on physical memory access; and to increase performance of translating virtual addresses to physical addresses.