**QUESTION**

**Discuss Classification and Functions of Operating System (OS).**

An **Operating System** (OS) is an interface between a computer user and computer hardware. An operating system is a software which performs all the basic tasks like file management, memory management, process management, handling input and output, and controlling peripheral devices such as disk drives and printers.

An operating system is software that enables applications to interact with a computer's hardware. The software that contains the core components of the operating system is called the **kernel**.

**Classification of Operating system.**

**Operating System is classified according to the following criteria:**

1. **Based on the processing method.**

**The following are types of Operating based on the processing method:**

**(I)Single program operating system**  
Single program operating system allows processing of only one user program in the main memory at a time. This means that the user can only run one interactive program at a time. Then the user must exit from the program before loading and running another program. An example of a single user operating system is MS DOS from Microsoft Corporation.

**(ii)Multitasking operating system**  
This type of operating system allows a single CPU to execute what appears to be more than one program at the same time. However, internally only one program is being executed at a time. The CPU switches its attention between programs as it receives requests for processing, executing statements from one program, and then from another using the concept of giving a time slice to each application. This switching of attention is so fast that it appears as if the programs are being executed simultaneously.

**(B)Classification according to number of users**  
**(I)Single user operating system**  
A single user operating system is designed for use by only one person. It cannot support more than one person and runs only one user application at a time.

**(II)Multi user operating system**  
Multi user or multi access operating system allows more than one user to interactively use the computer. It can be installed on a computer that is  
accessed by many people at the same time. Examples of such operating systems are UNIX, Novell and Windows NT/2000, Linux.

**(C)Classification according to interface**  
The term human computer interface refers to the method of interaction between the computer and the user and determines how easily the user can operate the computer. The underlying principle in operating system design is to make complex tasks very simple for the user to carry out. This is the reason why a lot of time has been spent by software developers in trying to come up with user friendly interfaces.

Currently the three main types of human computer interface are:

**(I)Command line Interface**  
The user interacts with a computer by typing a command at the prompt found on a command line. A computer reads instructions from the command line and executes them. For a command to be more user friendly, the words used should be descriptive verbs e.g., Print, copy etc. Unique abbreviations can also be used e.g., Del Ren Chkdsk etc.

For example, if you are using MS DOS operating system, you can copy a file called Fruits. Dat from a hard disk C to floppy disk A as follows: COPY  
C:\Fruits.Dat A:\

NB: The user must press the enter key for the command to be executed

Examples of command line interface are the early versions of MS DOS, PC DOS, OS/2, and UNIX. MS DOS Interface

**(II)Menu driven interface**  
This type of interface provides the user with a list of options to choose from. The interface therefore is suitable for beginners who may have difficulties recalling commands.  
Some operating systems present the user with simple menus while others have sophisticated menus. The user makes a selection ‘by typing any of the letters I, V, E, D or Q to activate a sub menu.

Later versions of DOS came with a menu driven interface called the DOS shell or DOS editor

**(III)The graphical user interface (GUI)**  
The GUI is the latest effort to make the user-interface more user friendly. Besides menus, GUI make use of rectangular work areas called windows, graphical objects called icons and most commands executed using a pointing device (cursor). The features are given an acronym WIMP which stands for Windows, Icons, Menus and Pointing devices.  
Examples of GUI based operating systems are OS/2s ,Presentation Manager, Microsoft Windows, Linux and Apple Macintosh.

**Functions of Operating System:**

1. Memory Management: It is the management of the main or primary memory. Whatever program is executed, it has to be present in the main memory.  Main memory is a quick storage area that may be accessed directly by the CPU. When the program is completed, the memory region is released and can be used by other programs. Therefore, there can be more than one program present at a time. Hence, it is required to manage the memory.

* In multiprogramming, the operating system selects which processes acquire memory when and how much memory they get.

2. Processor Management/Scheduling: Every software that runs on a computer, whether in the background or in the frontend, is a process. Processor management is an execution unit in which a program operates. The operating system determines the status of the processor and processes, selects a job and its processor, allocates the processor to the process, and de-allocates the processor after the process is completed.

When more than one process runs on the system the OS decides how and when a process will use the CPU. Hence, the name is also CPU Scheduling. The OS:

* Allocates and deallocates processor to the processes.
* Keeps record of CPU status.

Certain algorithms used for CPU scheduling are as follows:

* First Come First Serve (FCFS)
* Shortest Job First (SJF)
* Round-Robin Scheduling
* Priority-based scheduling etc.

Purpose of CPU scheduling

The purpose of CPU scheduling is as follows:

* Proper utilization of CPU. Since the proper utilization of the CPU is necessary. Therefore, the OS makes sure that the CPU should be as busy as possible.
* Since every device should get a chance to use the processor. Hence, the OS makes sure that the devices get fair processor time.
* Increasing the efficiency of the system.

3. Device Management: An operating system regulates device connection using drivers. The processes may require devices for their use. This management is done by the OS. The OS:

* Allocates and deallocates devices to different processes

4. File Management: The operating system manages resource allocation and de-allocation. It specifies which process receives the file and for how long. It also keeps track of information, location, uses, status, and so on. These groupings of resources are referred to as file systems. The files on a system are stored in different directories. The OS:

* Keeps records of the status and locations of files and allocates and deallocates resources.

5. Storage Management: Storage management is a procedure that allows users to maximize the utilization of storage devices while also protecting data integrity on whatever media on which it lives. Network virtualization, replication, mirroring, security, compression, deduplication, traffic analysis, process automation, storage provisioning, and memory management are some of the features that may be included. The operating system is in charge of storing and accessing files. The creation of files, the creation of directories, the reading and writing of data from files and directories, as well as the copying of the contents of files and directories from one location to another are all included in storage management.

6.Security – For security, modern operating systems employ a firewall. A firewall is a type of security system that monitors all computer activity and blocks it if it detects a threat.

7.Job Accounting – As the operating system keeps track of all the functions of a computer system. Hence, it makes a record of all the activities taking place on the system. It has an account of all the information about the memory, resources, errors, etc. Therefore, this information can be used as and when required.