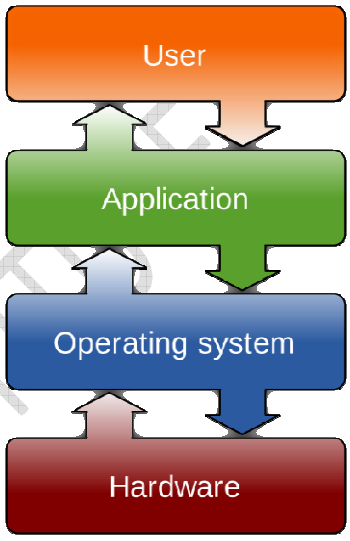
DCA – (102) OPERATING SYSTEMS

1. INTRODUCTION – (3 MARKS)

The set of instructions given to a computer to perform a task is called a **program**. The most important program for a computer is the **operating system** (OS).



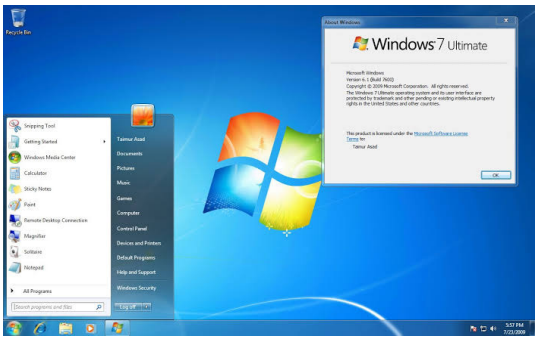
What is an Operating System? An operating system is an integrated set of specialised programs that are used to manage the resources and overall operations of a computer.

Example of Operating System:

(i) ***Windows:*** MS-DOS was a predecessor of the Windows Operating System. The MS-DO OS used a **Character User Interface (CUI)**. It means that it understood text-based commands. Windows on the other hand incorporates a **Graphical User Interface (GUI).** GUI uses pictorial icons rather than text, to help the user interact with an application.

(ii) ***UNIX:*** Unix is a multi-user, multi-tasking and virtual-memory operating system that runs on a wide variety of hardware platforms. Unix was developed at AT & T Bell Laboratories in 1968 by Dennis Ritchie and Ken Thompson.

iii) **GNU/LINUX**: Linux is an UNIX-like computer operating system. It is a free and open-source program. It was originally developed by Linus Torvalds in 1991 for personal computers. Today it is a leading OS for servers, mainframe and supercomputers. **Android** is also built on the Linux platform. **Ubuntu** and **Fedora** are the most popular Linux distribution packages.



iv) **BOSS**: A GNU/Linux based operating system developed by C-DAC (*Centre for Development of Advanced Computing*) available in various Indian languages.

Main Functions Of Operating System Are:

(i) **Process Management**: The role of the OS is to allocate hardware and software resources so that a process could be smoothly executed.

(ii) Memory Management: The operating system manages the Primary Memory/Main Memory (RAM). Main memory can be accessed directly by the CPU. For a program to be executed, it should be first loaded in the main memory.

(**iii**) **File Management:** The term file management refers to manipulation of documents and data in files on a computer. Thus, file management, which includes organizing, naming, protecting, accessing and using files, is one of the key functions of an operating system.

(iv) Device Management: The role of the operating system is to bring in a seamless coordination between various devices that are being used to accomplish the task of the user.

(**v**) **Input/Output Management**: It carries I/O management, co-ordinates and assigns to them.

(vi) Scheduling: It establishes and enforces the job priority order.

(vii) Time-sharing: It coordinates and assigns compilers, assemblers, utility programs and other software packages to various users working on the computer system.

(viii) Security Management: It establishes data security and integrity.

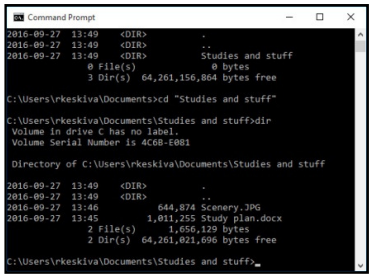
2. OPERATING SYSTEM BASIC (3 MARKS)

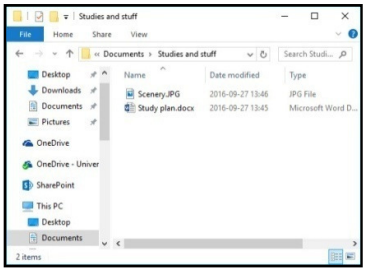
TYPES OF OPERATING SYSTEM ARE:

i) Real-time Operating System (RTOS) – This kind of operating system is primarily used to control machinery, scientific instruments and industrial systems. Thus, in an RTOS, key to operations is time precision rather than the efficiency of the processor.

ii) Single Use/Single Tasking Operating System - As the name implies, this operating system is designed to manage the computer so that one user can effectively do one thing at a time. The Palm OS for Palm handheld computers is a good.

iii) **Single-user, multi-tasking** - This is the type of operating system most people use on their desktop and laptop computers today. Microsoft's Windows and Apple's Mac OS platforms are both examples.





iv) **Multi-user, multi-tasking** - A multi-user operating system allows many different users to take advantage of the computer's resources simultaneously. Unix and VMS are good examples.

v) Operating System Base on Interfaces – A **text-based user interface** (see the image to the left) displays text, and its commands are usually typed on a command line using a keyboard. With a **graphical user interface** (see the right-hand image),

the functions are carried out by clicking or moving buttons, icons and menus by means of a pointing device.

Running Programs (3 Marks)

You can run applications or programs by choosing any one of them from the **Start** menu or from the **All Programs** menu. The All Programs menu, lists all the programs that have been installed on the computer.

1. To start an application or a program, click on the **Start button** and choose the desired program or application or choose the **All Programs** menu to see the listing of all the installed programs.
2. Click on the program or an application that you wish to start.
3. In case you wish to open a document associated with the program, click on the **Start button** and choose the **program** along with the document name.

Managing Hardwares (3 Marks)

A computer is a mixed of hardware and software**.** Every piece of hardware come with software called a 'device driver', for example, the printer will have a printer driver, a mouse will have its own mouse driver.

Process Interrupts are signals sent to the CPU by external devices, normally I/O devices. They tell the CPU to stop its current activities and execute the appropriate part of the operating system. There are three types of interrupts: *Hardware Interrupts, Software Interrupts* and *Traps*.

Working with Devices Driver: A device driver is a software program that controls a particular type of hardware device that is attached to a computer. In Windows operating systems, a device driver file usually has a file name suffix of **.DLL** or **.EXE**. A virtual device driver usually has the suffix of **.VXD**.

Enhancing Operating System With Utility Softwares (3 Marks)

Utility software is system software which aims to analyse, configure, optimise, maintain and take best use of a computer's resources. Utility software is also referred to as **service program**, **service routine** or **utility routine**. Some typical examples under the category are as follows.

- **Anti-virus programs** – The purpose of anti-virus is to prevent, detect and remove malware like viruses, worms or Trojans.

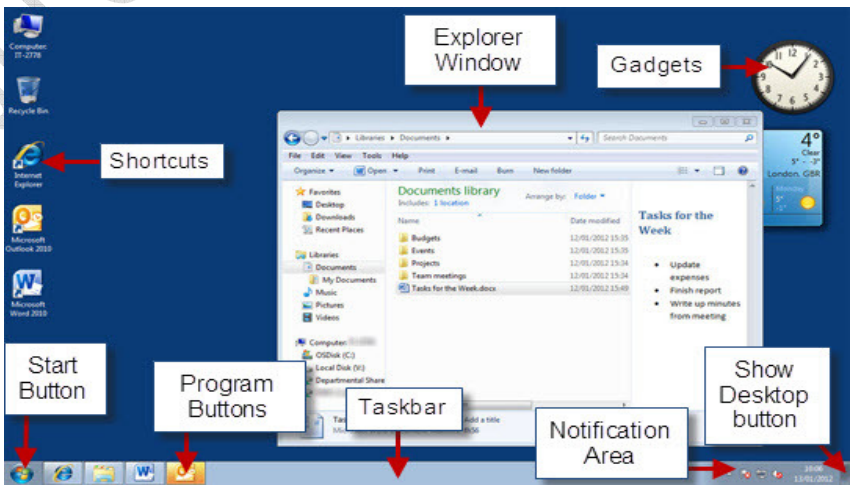
- **Encryption/decryption tools** – Encryption is a process of converting sensitive data into a form that cannot be read easily by unauthorised people. Decryption is converting the encrypted data back to its original form.
- **Firewall** - is a network security system that monitors and controls incoming and outgoing network traffic based on predetermined security rules. A firewall typically establishes a barrier between a trusted internal network and untrusted external network, such as the Internet.
- **Backup Utilities** - are computer programs used to perform a backup; they create supplementary exact copies of files, databases or entire computers.
- **Screensavers** - is a computer program that blanks the screen or fills it with moving images or patterns when the computer is not in use.

3. MIROSOFT WINDOWS 7 (5 MARKS)

An Overview of Different Versions of Windows: Windows is an Operating System with a GUI (*Graphical User Interface*) developed by Microsoft Corporation, USA.

The first independent version of Microsoft Windows, version 1.0, released on November 20, 1985. Microsoft Windows 3.0 was released on May, 1990. August 1995, Windows 95 was released. After Windows 95, the other versions were Windows 98 (September 1998), Windows ME (September 2000), Windows XP (October 2001), Windows Vista (November 2006), Windows 7 (October, 2009), Windows 8 (October 2012) and the latest in the series is Windows 10 (July 29, 2015).

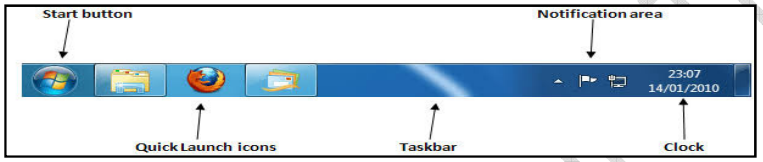
4. BASIC ELEMENTS OF OPENING SCREEN OF WIN 7 (5 MARKS)



Windows Desktop: Desktop is the first screen that appears when a computer is switched on. It remains in the background even if any program is running. A desktop will typically have *icons, Start Menu* and *Taskbar.* Desktop is actually a folder in the C drive, in the folder named Document and Settings.

Icons and Their Types: Icons are small pictures seen on the desktop. All shortcut icons have a tiny curved arrow at the lower left corner. The default icons common to all computers, such as *Computer, Documents, Recycle Bin* and *Internet Explorer* are also shortcuts, though they do not have arrow. Deleting a shortcut icon does not delete the item associated with it; only the icon gets deleted.

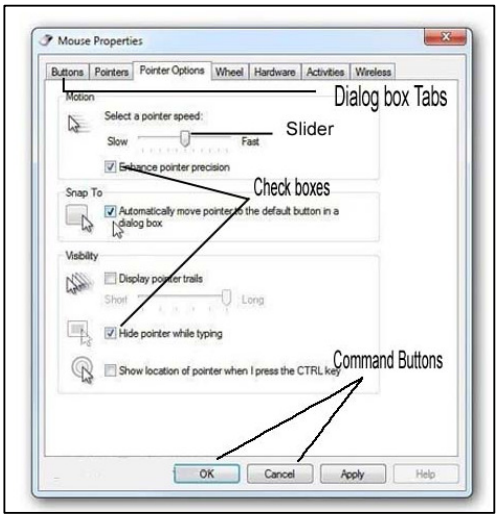
The Taskbar: The taskbar is the long horizontal bar at the bottom of the screen. It has three main sections: i) on the extreme left is the Start button. ii) The middle section shows the program or files you have opened. iii) On the extreme right is the notification area.



ELEMENTS OF A WINDOW:

Title Bar: Just below the top border of the window is the Title bar.

Minimize, Maximize and Restore Buttons: They are the three small buttons at the right end of the Title bar.



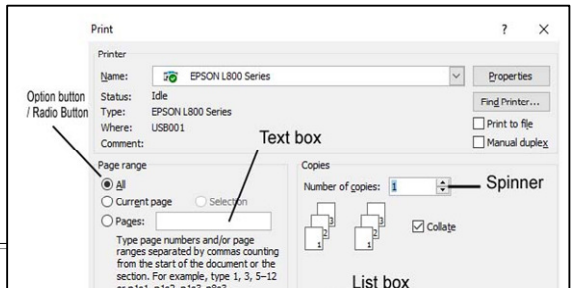
Scroll Bars, Scroll Boxes and Scroll Buttons: If a window is not long enough to display its contents completely, you can use ***vertical or horizontal scrollbar***.

Menu bar: The row of words just below the Title bar constitute the Menu bar.

Text boxes: Text box is also called an edit box and it is where you type in the information.

Check boxes: Check boxes are small square boxes.

Option Buttons: Option buttons are also called radio buttons.



Command Buttons: are used to execute a command immediately.

List Boxes: presents a list of options or items from which you can select.

Sliders: works like a sliding control.

Dialog box tabs: Using the keyboard, you can press the *Tab* key to move between sections and press the *Spacebar* to select them.

5. FILE MANAGEMENT IN WINDOWS 7 (5 MARKS)

File: is any collection of related information that is given a name and stored on a disk. Windows file names have two parts; the *file's name*, then a period followed by the *extension* **(suffix**). The extension is a three- or four-letter abbreviation that signifies the file type.

For example, in **letter.docx** the filename is **letter** and the extension is **.docx**. Extensions are important because they tell your computer what icon to use for the file, and what application can open the file. For example, the .**docx** extension tells your computer that the file is a Microsoft Word file..

Folder: is a special kind of file that contains a list of other files or subfolders.

Folder Tree: The arranging power of the folder system lies in the fact that it is hierarchical. Hierarchical means that folders can contain other folders.

Selecting Files and Folders: To select a file or folder, click on the file or folder. To select all the items in a folder, click the **Edit** menu and choose **Select All**. Or press Ctrl + A keys together on the keyboard.

Creating a folder:

1. Right-click in the window where you wish to make a new folder. Point to New.
2. Select Folder. A new folder by the default name New Folder gets created.
3. Rename the folder to a new desired name.
4. Or you can press **Ctrl + Shift + N** to create a new folder without using the mouse.

To rename a file or folder:

1. Right-click on the item and select **Rename**, or select the file and press F2.
2. Type the new name and press **Enter** or click on the item.

Copy a File or Folder:

1. Select the file you wish to copy by clicking over it.
2. On the **Edit** menu select **Copy**. Alternatively, you can right-click and choose **Copy** from the shortcut menu that appears.
3. Open the folder where you want the copy of the file.
4. On the **Edit** menu click **Paste**. Alternately, you can again right-click and choose **Paste** in the shortcut menu that appears.

Moving a File or Folder: One easy way to move a file is using a method called **drag and drop**.

To delete a computer file or folder:

1. Right-click the file or folder that you want to delete, and then choose **Delete**.
2. You can press the **Delete key** on your keyboard or choose **delete** from **Edit** menu.

6. WINDOWS START MENU (5 MARKS)

Getting Started with the Start Menu:

- Click on the **Start button** in the lower left corner of your computer screen; Or Press the **Windows** key on your keyboard.

All Programs: It display the Program menu, which contains many application programs you can run.

Control Panel: helps change the settings and customise the functionality of your computer.

Help and Support: In case you want some help while doing some activity on Windows, click help and support.

Printers and Faxes: It allows you to see the current status of the Printers and Faxes.

Search: It displays a Window by which you can find files, folders, computers, people, pictures, etc.

Run: if you want to use the Run box in Windows 7, you can type Run in the Search box and press Enter, OR press the shortcut keys **Windows key + R**.

Below are a list of commands you can type into the Run dialog box			
Run Calculator	**calc**	Run Wordpad	**wordpad**
Run Command Prompt	**cmd**	Run Notepad	**notepad**
Shutdown Windows	**shutdown**	Restart Windows	**shutdown -r**

Run Microsoft Word (if installed)	**winword**	Run Microsoft Excel (if installed)	**excel**
Task Manager	**taskmgr**	Log Off Windows	**logoff**
Device Manager	**devmgmt.msc**	Task Manager	**taskmgr**
Disk Management	**diskmgmt.msc**	Temporary Folder	**%temp%**

7. WINDOWS SHORTCUTS (5 MARKS)

A shortcut is a small file that is linked to a program, document, folder or an internet address. A shortcut is a pointer to an object, and not the object itself.

Adding Folder Shortcut to the Desktop:

1. Click on the file or folder you want to create the shortcut.
2. Right-click on that item.
3. In the ensuing shortcut menu, choose **Send To** and the click **Desktop (create shortcut)**. The shortcut icon appears on the desktop.

To rename a shortcut:

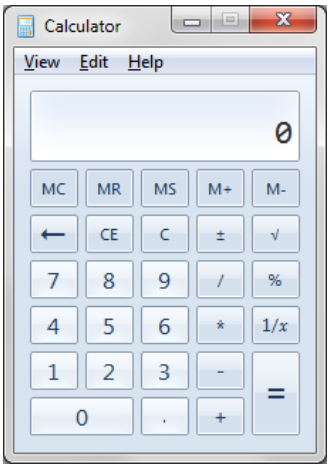
1. Right-click on the shortcut and select **Rename**.
2. Type the new name and press **Enter**.

To delete a shortcut:

1. Right-click the shortcut and then choose **Delete**.
2. You can press the **Delete key** on your keyboard or choose **delete** from **Edit** menu.

8. ESSENTIALS WINDOWS ACCESSORIES (5 MARKS)

The Window operating system is bundled with many useful programs. They are called ***Windows Accessories or Tools***. Let us look at some of them.



Calculator: The Calculator program is located in the **Accessories** folder. Choose *Start >> All Programs >> Accessories >> Calculator* to start Calculator application, or alternately you can open Run dialog box (Start >> Run) then type ***calc*** and hit enter.

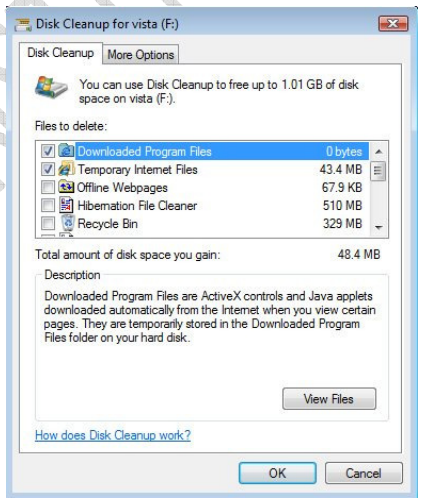
Paint: (formerly Paintbrush) is a program used to create drawings on the computer. It also located in the **Accessories** folder. Choose *Start >> All Programs >>*

Accessories >> Paint to start Paint application, or alternately you can open Run dialog box (Start >> Run) then type ***mspaint*** and hit enter.

WordPad is a basic word processor and it can format and print text, including fonts, bold, italic, colored, and centered text, etc., but lacks vital functions such as a spell checker, thesaurus, and control over pagination. It does not support footnotes or endnotes. Choose *Start >> All Programs >> Accessories >> Wordpad* to start Paint application, or alternately you can open Run dialog box (Start >> Run) dialog box then type ***wordpad*** and hit enter.

Notepad: Notepad is primarily used for creating files with plain text, that is, the text which is unformatted. The file extension of Notepad is **.txt**.

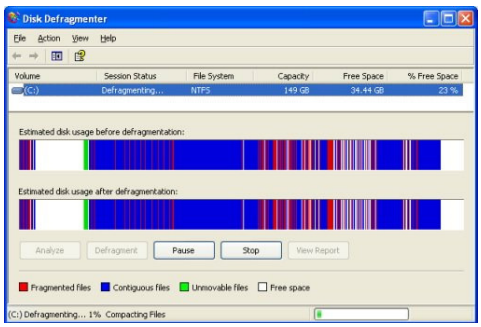
SYSTEM TOOLS: Windows includes some of the system utilities such as Disk Cleanup, Disk Defragmenter, System Restore, and Control Panel and so on.



Disk Cleanup: In Windows 7, Vista, and XP, Disk Cleanup frees disk space by cleaning areas that gather unneeded files. To run Disk Cleanup**:**

- From the **Start menu**, select **Programs** or **All Programs**, then **Accessories**, then **System Tools**, and then **Disk Cleanup**.
- Select the drive on which you would like to clear disk space (usually your C: drive), and click OK.
- Select from the four areas that Disk Cleanup will check and clean up

Disk Defragment: When your computer crashes or freezes, the drive becomes fragmented. This means the files may be broken up and stored in different locations in your computer. This causes programs and files to run more slowly.



To run Disk Defragmenter**:**

- Close **all programs**. Choose **Start menu** | **All Programs** | **Accessories** | **System Tools** | **Disk Defragmenter**.

- Select the drive you want to clean and click OK. Click Analyze. This may take several minutes. Click Close or Defragment.

System Restore: System restore is a feature of Windows that allows you to roll back the system to the same configuration it had at an earlier time. To run System Restore:

- Go to **Start > Programs > Accessories > System Tools > System Restore**.
- The System Restore screen will come up. Follow the on screen instructions

Control Panel: is used for adding hardware, installing and uninstalling software, controlling user accounts, and changing accessibility options. The Control Panel has two views, Classic View and Category View, and it is possible to switch between these through an option that appears on either the left side or top of the window.

Entertainment: The entertainment tools, such as Sound Recorder, volume Control, Windows Media Player, etc., allow you to play audio, video, or animation files and to control the settings for multimedia hardware devices.

9. COMMAND PROMPT AND MS-DOS COMMANDS (5 MARKS)

MS-DOS for Microsoft Disk Operating System is an operating system with a command-line interface used on personal computers.

To get command prompt, do this:

1. Click *Start Button > All Programs > Accessories > Command Prompt*.
2. Or Press Window key + R, type CMD and press enter.

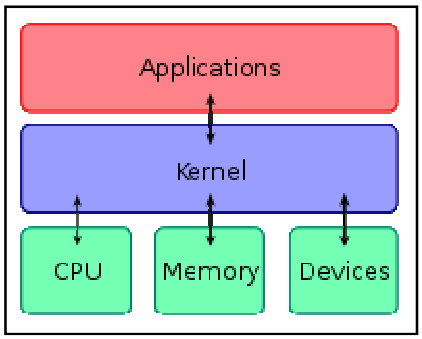
The most common MS-DOS internal command is listed below:-

1. To display directory**,** **-** **DIR**
2. To make directory, - **MD**
3. To remove directory, - **RD** OR **RMDIR**
4. To delete files or directory, - **DEL** Or **ERASE**
5. To clear the screen, - **CLS** OR **CLRSCR**
6. To display or change directory, - **CD** OR **CHDIR**
7. To display the attributes of all files, - **ATTRIB**

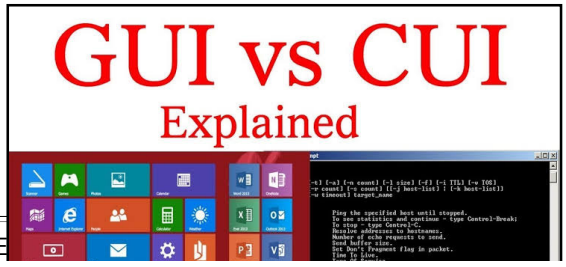
8. To Makes copies of existing files, - **COPY**
9. To exit the command prompt, - **EXIT**
10. To rename file, - **REN**
11. To move the file, - **MOVE**
12. To copy the file or directory - **COPY**
13. To display a file - **TYPE**
14. Shortcut key to copy text in MS-DOS - **CTRL + Z**

Extra Points to Remember:

1. **A WILDCARD character** is a symbol used to replace or represent one or more characters. The most common wildcards are the asterisk (*), which represents one or more characters and question mark (?) that represents a single character. For instance, if you want to search all Microsoft word file inside one's folder, just type ***.docx** in the search box. The windows will find all Microsoft word file irrespective of the filename.
2. **MS-DOS** has the following three layers: **BIOS, Kernel** and **Shell**.
3. **BIOS** - (**Basic Input/Output System** and also known as the **System BIOS, ROM BIOS or PC BIOS**) is *firmware* used to perform hardware initialization during the booting process (*power-on startup*), and to provide runtime services for operating systems and programs.



4. **The KERNEL** is a computer program that is the core of a computer's operating system. On most systems, it is one of the first programs loaded on **start-up** (after the *bootloader*). It handles memory and peripherals like keyboards, monitors, printers, and speakers.
5. **A SHELL** is a user interface for access to an operating system's services. In general, operating system shells use either a **command-line interface (CLI)**



or **graphical user interface (GUI)**. It is named a shell because it is the outermost layer around the operating system kernel.

6. **GNU** stands for '**G**nu is **N**ot **U**nix'.

7. **Clipboard**: The clipboard is a temporary holding area for information. Clipboard is in computer's memory; the Clipboard involves three commands: **Cut**, **Copy** and **Paste**.

8. **FIFO** is an acronym for **First In, First Out**, a method for organising and manipulating a data.

9. **LILO** is an acronym for **Last In, Last Out**, a method of storing data where the data stored last will be accessed last.

10. **File Allocation Table** (**FAT**) is a computer file system architecture and originally designed in 1977 for use on floppy disks. FAT was used almost universally on hard disks throughout the DOS and Windows 9x eras for two decades.

11. **NTFS (New Technology File System)** is a file system developed by Microsoft. Starting with Windows NT 3.1, it is the default file system of the Windows NT family.

12. **A SPECIAL CHARACTER** is a character that is not an alphabetic or numeric character. Some special characters are;- ***@, %, $, &, !, *,*** etc.

13. **32-bit vs 64-bit**: A 64-bit processor is more capable than a 32-bit processor, because it can handle more data at once. 32-bit processors are perfectly capable of handling a limited amount of RAM (in Windows, 4GB or less), and 64-bit processors are capable of utilizing much more.

14. **DOS** commands are of two types; *internal and external*. The ***internal commands*** are those commands that are automatically loaded in the memory. Some internal commands are; *Cls, Dir, Date, Time, Copy con, Type, Ren, Del* etc. The external commands are not permanent part of the memory. To execute or run this commands an external file is required. Some commonly used DOS *external commands* are;- *CHKDSK, Diskcopy, Format, Tree, Deltree* etc.

15. **BOOTING**: Boot means ‘start’ or make the computer system ready for taking instructions. When the computer is first switched on, it is called *cold booting*. When the computer is already ON and is being reset, it is called *warm booting*.

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