## CMOS setup and windows installation

**Objectives :** At the end of this lesson you shall be able to
• **describe the functions of BIOS and CMOS**
• **describe the method of viewing and changing BIOS settings**
• **describe the meaning of partitioning  and formatting**
• **describe the process of installing Windows operating system.**

The Basic Input/Output System (BIOS), also known as System BIOS, ROM  BIOS  or PC BIOS is a generally accepted standard defining a firmware interface.

The fundamental purpose of the BIOS is to initialize and test the system hardware components and load an operating system from a mass memory device. The BIOS is special software that interfaces the major hardware components of the computer with the operating system. It is usually stored on a Flash memory chip on the motherboard, but sometimes the chip is another type of ROM. The BIOS is a firmware (software instructions permanently recorded on a chip located on your motherboard). (Refer Fig.1).



Fig 1

Copa 181301

### Functions of BIOS

The BIOS software has a number of different roles, but its most important role is to load the operating system. The BIOS checks and initializes the PC hardware each time the system powers up or restarts before handing over control to the operating system. Some of the other common tasks that the BIOS performs include:

• A power-on self-test (POST) for all of the different hardware components in the system to make sure everything is working properly

• Activating other BIOS chips on different cards installed in the computer - For example the graphics cards often have their own BIOS chips.

• Providing a set of low-level routines that the operating system uses to interface to different hardware devices. They manage things like the keyboard, the screen, and the ports, especially when the computer is booting.

• Managing a collection of settings for the hard disks, clock, etc.

### CMOS Setup

The first thing the BIOS will do is check the information stored in a tiny (64 bytes) amount of RAM located on a complementary metal oxide semiconductor (CMOS) chip. The CMOS Setup provides detailed information particular to your system and can be altered as your system changes. The BIOS uses this information to modify or supplement its default programming as needed.

### Configuring BIOS

The BIOS checks the CMOS Setup for custom settings. To change the CMOS settings we need to enter the CMOS setup. To enter the CMOS Setup, a certain key or combination of keys must be pressed during the initial startup sequence. Most systems use "Esc," "Del," "F1," "F2," "Ctrl-Esc" or "Ctrl-Alt-Esc" to enter setup. There is usually a line of text at the bottom of the display that tells "Press ___ to Enter Setup."

The BIOS setup shows a set of text screens with a number of options. Some of these are standard, while others vary according to the BIOS manufacturer. Common options include:

• System Time/Date - Set the system time and date

• Boot Sequence - The order that BIOS will try to load the operating system

• Plug and Play - A standard for auto-detecting connected devices; should be set to "Yes" if your computer and operating system both support it

• Mouse/Keyboard - "Enable Num Lock," "Enable the Keyboard," "Auto-Detect Mouse"...

• Drive Configuration - Configure hard drives, CD-ROM and floppy drives

• Memory - Direct the BIOS to shadow to a specific memory address

• Security - Set a password for accessing the computer

• Power Management - Select whether to use power management, as well as set the amount of time for "standby" and "suspend"

- Exit - Save your changes, discard your changes or restore default settings.

The BIOS uses CMOS technology to save any changes made to the computer's settings. With this technology, a small lithium or Ni-Cad battery can supply enough power to keep the data for years. Major BIOS manufacturers include American Megatrends Inc. (AMI), Phoenix Technologies, Winbond etc. A typical BIOS screenshot is shown in fig. given below.(Refer Fig.2)


Fig 2

Copa 181302

## Installing the Windows operating System

A hard disk needs to be partitioned (though not mandatory) and formatted before you can store data on it.

## Partitioning

A partition, sometimes also called a volume, is an area on a hard disk that can be formatted with a file system and identified with a letter of the alphabet. For example, drive C on most Windows computers is a partition. the first three partitions you create are primary partitions. These can be used to start an operating system. If you want to create more than three partitions, the fourth partition is created as an extended partition.

An extended partition is a container that can hold one or more logical drives. Logical drives function like primary partitions except that they cannot be used to start an operating system.

Many computers are partitioned as a single partition that equals the size of the hard disk. Partitioning a hard disk into several smaller partitions is not required, but it can be useful for organizing data on your hard disk.

Creating more than one partition has the following advantages:

- Separation of the operating system (OS) and program files from user files.

- Having a separate area for operating system virtual memory swapping/paging.

- Keeping frequently used programs and data near each other.

- Use of multi-boot setups, which allow users to have more than one operating system on a single computer. For example, one could install Linux and Microsoft Windows or other operating systems on different partitions of the same HDD and have a choice of booting into any operating system at power-up.

- Protecting or isolating files, to make it easier to recover a corrupted file system or operating system installation. If one partition is corrupted, other file systems may not be affected.

- Raising overall computer performance on systems where smaller file systems are more efficient.

- Partitioning for significantly less than the full size available can reduce the time for diagnostic tools such as checkdisk to run.

## Formatting

Disk formatting is the process of preparing a data storage device such as a hard disk drive, solid-state drive or USB flash drive for initial use. It is the act of creating a file system on a volume, so that the operating system can store and retrieve data on that volume.

## Formatting of a disk is of two categories:

1 Low-level formatting (i.e., closest to the hardware) marks the surfaces of the disks with markers indicating the start of a recording block. It also provides information about block checks done for future use by the disk controller to read or write data. This is intended to be the permanent foundation of the disk, and is often completed at the factory. A hard disk needs to be partitioned and formatted before you can store data on it

2 High-level formatting creates the file system format within a disk partition or a logical volume. This formatting includes the data structures used by the OS to identify the logical drive or partition's contents. This may occur during operating system installation, or when adding a new disk.

## Installing the Windows operating System

The three basic types of windows installation procedures are as follows:

- Install on a brand new disk or computer system

- Erase the disk, format it, and install.

- Install into a new directory for dual-booting

For the first two methods, it must be ensured that the computer can boot from a DVD or any other removable drive. To do this the drive boot order needs to be changed in the BIOS. The latest Windows DVDs are bootable and run the Setup program automatically. Then the installation can be done by following the procedure step by step as indicated on the subsequent screens as in trade practicals.

## CMOS setup and windows installation

**Objectives :** At the end of this lesson you shall be able to
• describe the functions of BIOS and CMOS
• describe the method of viewing and changing BIOS settings
• describe the meaning of partitioning and formatting
• describe the process of installing Windows operating system.

### Format a hard drive



Fig 1

Copa 110101

There are many reasons why it is required to format a hard drive, such as to install Windows fresh, to get rid of a virus or malware or simply because a pc is refreshed or cleaned up on selling.

The process can be different depending on whether it's an only hard drive and whether there is a spare PC or not.

It cannot be formatted, the hard drive on which Windows is running. In order to do this, it is in need to boot the PC from a Windows installation disc, a USB flash drive or another bootable disc.

### Format a disk?

Formatting is the process of deleting all the data on the hard drive, but beware of 'Quick Format' which leaves all data in place and makes the drive appear to be empty. A quick format is ok if there is a brand new hard drive, or need to reinstall Windows, but not if its disposing of the disk or giving it to someone else.

A word of warning: make sure to have successfully backed up any photos, videos, music and other documents from the drive before formatting it. Although deleted files can be recovered in some situations, prevention is always better than cure.

### Format hard drive partitions

It's important to understand about partitions before getting started. A hard drive can be divided up into smaller sections, called partitions. It's possible to format one partition while leaving the others untouched.

If it isrequired to format the entire hard drive and use the entire capacity in one block, delete the partition information.

### Format a hard drive from the BIOS?

Many people ask how to format a hard disk from BIOS. The short answer is no.

If it is required to format a disk and you can't do it from within Windows, create a bootable CD, DVD or USB flash drive and run a free third-party formatting tool.

One option is Darik's Boot and Nuke (DBAN), which is free for personal use. This program will totally erase and format your hard disk, allowing for a clean install of a new OS, but the process cannot be undone.



Fig 2

Copa 110102

DBAN is supposedly only able to create a bootable CD/ DVD-R, but if don't have any blank discs or a burner, there is a workaround available in the form of a separate third-party program.

Universal USB Installer will quickly and easily convert the DBAN ISO image downloaded to run from a bootable USB. Simply insert a blank USB flash drive, run the Universal USB Installer setup program, and follow the prompts.

It will ask to scroll through and pick the Linux Distribution want to install to USB (in this case, the latest version of DBAN), followed by its location on the computer and the letter of the USB drive like to install it to.

Once that information is complete, click create.

Fig 3



Copa 191503

To boot from this USB drive rather than usual boot device (in most cases, this would be the hard drive), it have to be changed some settings in the BIOS.

In the BIOS, navigate to the boot order settings, and change the primary boot device to the USB drive (it shouldn't need to be plugged in to make this selection). After saved the settings and exited the BIOS, insert the bootable USB, restart the computer.

Fig 4



Copa 191504

The PC should automatically boot the DBAN software, which will guide through the process of erasing the hard drive, with options for different levels of data-wiping.

It will treat the USB as another drive so to avoid inadvertently wiping that as well, remove it after booted into DBAN.

**Quick format a hard drive?**

Yes, but don't use this method if want the data to be permanently erased. A quick format doesn't delete the data but instead erases only the pointers to the files.

Windows Vista, 7, 8 and 10 have a built-in Disk Management tool (see below), but the fastest way to format a hard drive is to click the Start button, then Computer and right-click on the hard drive to wipe. It can't be formatted the drive on which Windows is installed for obvious reasons.

Fig 5



Copa 191505
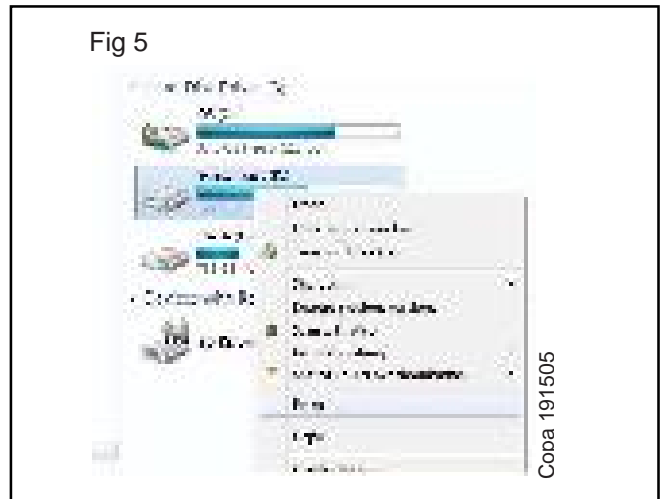
By default Quick Format is checked, and choose the file system and allocation unit size as well as changing the volume label (the drive's name). Typically, leave all settings unchanged and click the Start button. In under a minute the hard drive will be formatted.

Fig 6



Copa 191506

Choose NTFS as the file system if it isn't already selected for Windows Vista, 7, 8 or 10 and ensure the Allocation Unit Size is set to 'Default Allocation Size'.

**Using the Disk Management tool**

Type diskmgmt.msc or Disk Management into the search box in Vista, 7, 8 or 10 and then click on only result that appears in the menu above, with the same name.

This is the easiest way to launch Disk Management, but also find it in the Control Panel if search for 'disk' and select the 'Create and format hard disk partitions'.

Disk Management isn't as powerful as a standalone partition management tool, but it is still capable of formatting data.

Copa 191507

If it is to install a new (additional) hard drive in a PC, it might be a thing to wonder why it doesn't appear in Windows Explorer. The reason is because it needs to be initialised and formatted -which can be done in Disk Management.

When the tool loads, it will analyse all of the computer's drives and will prompt to initialise a new disk that it finds.

Fig 8
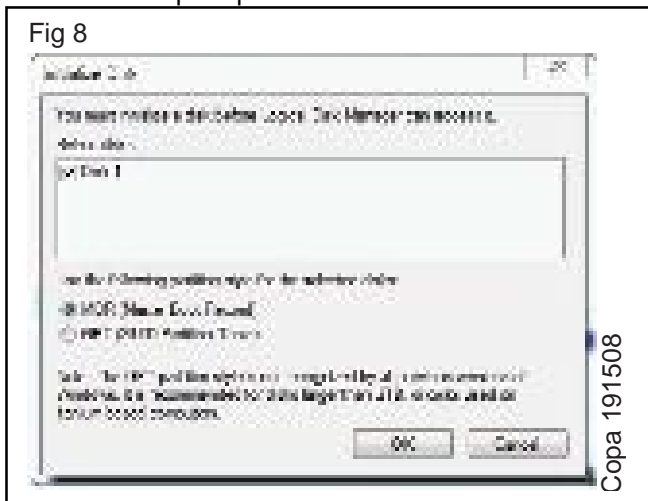


Copa 191508

If the disk is larger than 2TB, opt for GPT (GUID Partition Table). This setting also lets to create more than four partitions.

If don't see a prompt, look in the list of drives and see one that says 'Not Initialized'. Right-click on it and choose Initialize Disk.

Once that's done, right-click in the hatched Unallocated space and choose New Simple Volume…

Follow the instructions, choosing how big to want the partition to be (in MB - 1024MB = 1GB), and which drive letter to assign (one will be chosen, but can opt to change it if desired).

If select a size for the partition that's smaller than the total capacity of the drive, say 500B on a 1TB drive, end up with some unallocated space on the drive which can format by repeating the process just completed.

**change partition size**

Disk Management can be used to expand or shrink a partition. Simply right-click on one and choose the appropriate option from the menu that appears. If shrinking, the partition will be checked to find out how much empty space it contains.

Fig 9
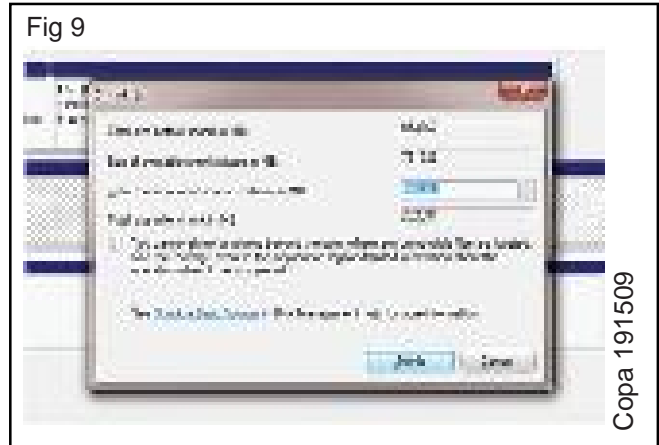


Copa 191509

It's a little confusing as the numbers are displayed in MB rather than GB, but it can be adjusted the amount of space to shrink and the 'Total size after shrink' will be updated, alsocan't shrink a partition beyond the point where files are located - it may be able to free up space by defragmenting the drive first.

Conversely it can only expand a partition if there is unused space on the drive. If not, the option will be greyed out.

**Resetting Windows**

If PC is having problems and the user don't wish to lose the personal files by wiping the hard drive, then it might want to refresh or reset the PC which can be done in Windows 8 and 10.

If user looking to keep your personal files and settings, but want to have a fresh Windows install, itsall want to refresh the PC.

Do note that a refresh will remove all programs and apps installed on the machine, but will keep the Windows-default programs intact.

A reset reinstalls Windows and deletes all files, settings and programs, it is suggested performing this if have previously backed up all the files and don't mind transferring user's personal files.

Windows 10 has a slightly different approach and might confuse those coming from Windows 8. Microsoft removed the refresh option and has instead combined the refresh and reset options into one setting.

**IT & ITES : COPA - (NSQF Level - 4): Related Theory for Exercise 1.4.14 & 1.4.15**

Fig 10



To find the option, open the Start Menu, click on Settings > Update & security > Recovery > Get started (under the Reset this PC option).

Upon selecting the option, it will present with three separate options:

• Keep my files

• Remove everything

• Restore factory settings (not available on all PCs)

'Keep my files' saves personal files but deletes user settings, drivers and programs, whilst also reinstalling Windows 10.

'Remove everything' also gets rid of personal files and 'Restore factory settings' does the same actions as 'Remove everything', but also resets the PC to the version of Windows which came with the machine.

This option will only be available to those who bought a pre-built PC or laptop which came with Windows already pre-installed.

# Troubleshooting computer

**Objectives:** At the end of this lesson you shall be able to
- **state the basic steps involved in troubleshooting a PC**
- **explain the basic approach to solve a problem**
- **list the probable defects and symptoms in a faulty Computer**
- **analyse the causes for the complaints**
- **state the shortest path for servicing the defects.**
- **list the probable defect and symptoms in the faulty Computer**
- **analyse the causes for the complaint "When windows is started, system runs surface test and goes to safemode" with the help of a Problem Tree and TSC**

## Basic Troubleshooting

One of the difficulties while troubleshooting problems on a PC is that in most cases they are not what they seem. The cause behind a frequent hanging of a PC may be due to one of six or more well defined areas or a dozen of unidentified problems. The problem could be due to software or hardware. Even with years of experience and training, PC technicians come out with troubleshooting procedures that do not solve the real problem. For example a personal computer running windows operating system with several i/o cards connected may freeze the screen , mouse, and keyboard and take as long as 3 minutes before responding. After trying out with all the options like replacing a memory module, installing new parallel port and NIC drivers, the technician finally checks the system logs to find that a vital operating system library was corrupted and needed to be reinstalled.  The issue to be mentioned here is that if the technician used a systematic approach to troubleshooting, the  problem would likely have been solved much sooner. Maintaining a good troubleshooting plan certainly gives us the scope to approach the problem in a more systematic and scientific manner. A troubleshooting plan is nothing but a written check list that we use for any problem. The elements that should be included in any troubleshooting plan are as follows

- Maintenance record

- Identification of possible causes

- Identification of possible solutions

- Application and testing of solutions

- Follow-up

In the maintenance record, record the hardware installed in the PC when it is installed, all preventive maintenance activities, all software updates or additions, and all hardware installations and upgrades. Further any problems that occur and the actions you take  to resolve them should be recorded . when it comes to troubleshooting a PC, with the maintenance record one can pin down a problem and devise solution for it. The first entry in such record should be a profile of the PC, which includes its configuration, operating system, and the date each component was installed.

Such tables gives an idea of the type of information one should include in the sytem configuration, as summerised below:

- The processor's make, model and speed.

- Amount of system memory(RAM) and the memory module type, size and configuration of the memory

- Hard disk size and the type of interface

- Make, model and speed of the compact disk (CD) or digital versatile disk ( DVD) drive

- Memory size of the video or graphics adapter

- Make, model, type  and speed of the modem

- The version number  of the operating system

- A list of software applications  installed on the PC

- A list of peripheral equipment attached to the PC, indicating the port to which they are attached

The maintenance record should be updated each time any maintenance work is carried over on the PC. Any time new or replacement hardware is installed, record the activity and update the system configuration. The activity entries should include

- Date of the activity or changes made to the system

- The make, model and serial number of any hardware removed or added to the PC

- The name, version and publisher of any software added to the PC

- Detailed information on any configuration changes made to the basic input/output system(BIOS) or other configuration for the new device or software.

## Troubleshooting approach

For solving any problems associated with PC, first go through the maintenance record of that PC and follow a systematic procedure for   isolating the problem. The standard problem solving process includes the following steps

**Identify the problem:** This is the most difficult part of the process. To  perform this step successfully collect all the data about the problem

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**Identify possible causes:** analyse all the symptoms of the problem and try to list all the causes in order from the most likely to the least likely.

**Identify possible solutions:** identify solutions for each of the causes that are identified. A possible cause could have more than one possible solution.

**Analyze the possible solutions:** if two solutions produce the same result, consider the one which is more economic and apply the same.

After following the above steps and on solving the problem update the maintenance record and make necessary entries into it. In some cases the problems may be very clear and the solution is very transparent and even in such cases try to follow the above mentioned steps to make it a practice to follow the systematic approach. Whenever a problem occurs with a PC, while following the steps, try to collect the information about the system by answering questions such as

– Under what circumstances this problem cropped up?

– Were there any indications in the form of beep codes/ error messages or any clear symptoms?

– What softwares were active when the problem happened?

– Has it happened for the first time or occurred in the past also?

– Were there any configuration changes made during the session that required a restart that was not performed?

**Optimizing the PC:**

A PC which was functioning absolutely well and developed a symptom of slowing down or if it is unable to keep pace with the demands of newer software, one of the possible solutions is to consider updating or optimizing the PC to enhance its performance. Optimization steps may cost money , but many involve software you already own or software readily available on the web.

**Optimizing the BIOS and Boot process:**

BIOS setup configuration includes many settings in the CMOS. How quickly the system boots and performs depends on the these settings. Enabling of valuable features such as system caching or using the quick POST process are very vital for optimum peroformance.

**Optimizing the hard disk:** Windows ScanDisk and Disk Defragmenter utilities are the best tools available for optimizing the hard disk in terms of usage and access speeds. ScanDisk is used to check a disk for errors and repair them or remove unrecoverable areas of the disk from the usage tables to prevent future errors. Similarly Disk Defragmenter organizes data file fragments into a more optimized and logical format that provides for faster access times and less head movement.

**Optimizing the Expansion cards:** The best way to optimize I/O controllers and other expansion cards is to install them in the correct order. No harm is done even if

they are installed out of order, but there is some benefit to be gained from putting them in the proper sequence. On a Pentium system, use PCI cards and avoid ISA cards, if possible. All I/O adapters including video cards, sound cards, NICs, modems and SCSI adapters are available for the PCI expansion bus. Consult the motherboard documentation and install video card in the first PCI slot, followed by the NIC, modem, and sound card, in that order.

**Optimizing the processor:** One can speed up the processor in the following ways

– Replace it with a faster speed or higher level processor

– Use a utility from the processor manufacturer to apply patches or fixes to the processor's logic

– Overclock the processor

The requirement for replacing the processor with a higher level or faster processor is that your motherboard and chipset will support the new processor both logically and physically. Logically the chipset and motherboard must support the bus speed of the processor and have the supporting circuits it requires. It is often much better to

replace the complete motherboard. Some times the manufacturer of the processor may release some utilities that will improve some aspect of processor's capabilities such as video processing, buffer handling, caching and other processor based functions. Overclocking a processor means running a processor at speeds faster than it was released to support. Most processors are capable of running at speeds higher than their nominal speeds. The nominal speed of a processor is the speed at which it has been tuned to run with a certain chipset, motherboard, cooling system, and other components of the PC. Raising the speed of the processor can create heating problems on the processor and lead to frequent system lockups, memory problems and other issues.

**Troubleshooting sources of Non-software problems:**

Any time pc fails for no apparent software reason, check the following areas

– Ensure proper AC power

– Scan the PC for a computer virus

– Ensure that CPU fan is spinning

– Ensure proper connections of external I/O connectors

– Reseat the expansion cards and check the power and data cables of internal devices

– Most of the boot problems are the result of a recent change, check out the BIOS setup configuration data

– To install any new hardware or software, visit manufacturer's web site for any known conflict or incompatibility

– Check for any resource conflict if any new hardware or software is installed.

The forth coming lessons on Troubleshooting PC are provided with Problem Trees for different type of problems which a user face normally. Each Tree with a specific
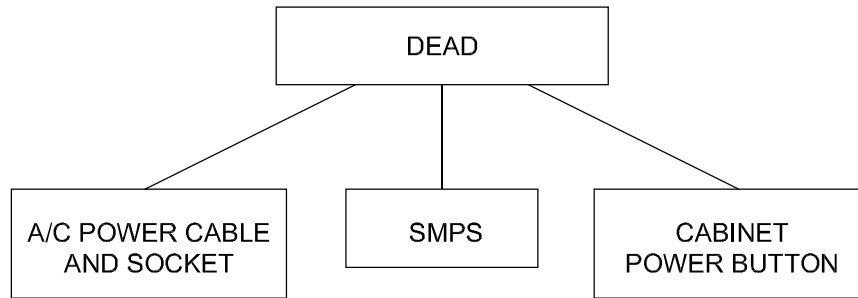
problem gives scope to analyse the areas to be suspected or looked into for fixing the problem. This lesson includes a Problem Tree for a PC which is Dead with no display on monitor.

PROBLEM TREE : **PT- 01**
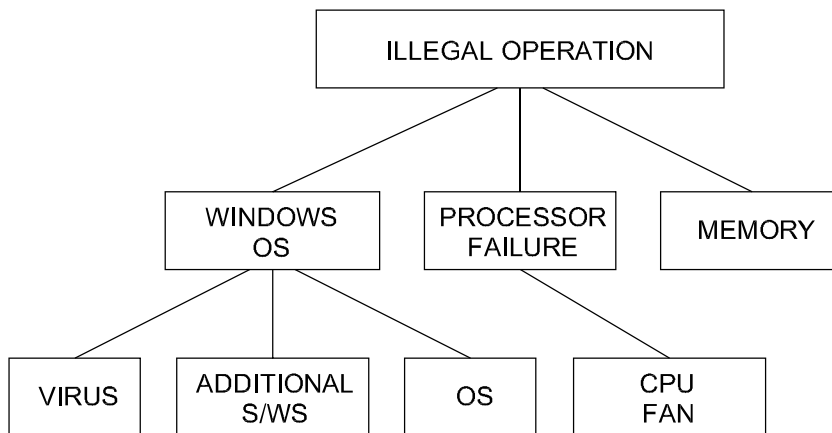
Observed symptom         :   Dead

Additional symptom         :   No display

```
                          ┌─────────────┐
                          │    DEAD     │
                          └─────────────┘
             ┌──────────────────┼──────────────────┐
   ┌──────────────────┐  ┌─────────────┐  ┌──────────────────┐
   │ A/C POWER CABLE  │  │    SMPS     │  │     CABINET      │
   │   AND SOCKET     │  │             │  │  POWER BUTTON    │
   └──────────────────┘  └─────────────┘  └──────────────────┘
```
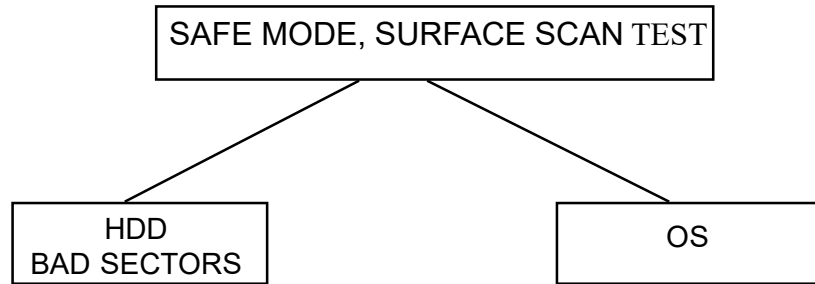
PROBLEM TREE : **PT- 02**

Observed symptom         :   Windows shows "illegal operation"
Additional symptom         :   Windows not working

```
                     ┌──────────────────────┐
                     │  ILLEGAL OPERATION   │
                     └──────────────────────┘
            ┌─────────────────┼──────────────────┐
    ┌─────────────┐   ┌─────────────┐   ┌─────────────┐
    │  WINDOWS    │   │ PROCESSOR   │   │   MEMORY    │
    │    OS       │   │  FAILURE    │   │             │
    └─────────────┘   └─────────────┘   └─────────────┘
      ┌──────┬─────┴──────┬──────────┐
  ┌────────┐ ┌──────────┐ ┌──────┐ ┌──────────┐
  │ VIRUS  │ │ADDITIONAL│ │  OS  │ │   CPU    │
  │        │ │   S/WS   │ │      │ │   FAN    │
  └────────┘ └──────────┘ └──────┘ └──────────┘
```

---

**Discuss the Troubleshooting chart (TSC-02) and Service flow sequence (SFS-02) for the complaint "While working, windows shows error - illegal operation".**

**Various faults discussed for the above complaint shall be applied to actual Computer given to you for practical exercises.**

---

```
                    ┌─────────────────────────────────┐
                    │  SAFE MODE, SURFACE SCAN TEST   │
                    └─────────────────────────────────┘
                          /                    \
                         /                      \
          ┌──────────────────┐          ┌──────────────────┐
          │      HDD         │          │        OS        │
          │  BAD SECTORS     │          │                  │
          └──────────────────┘          └──────────────────┘
```
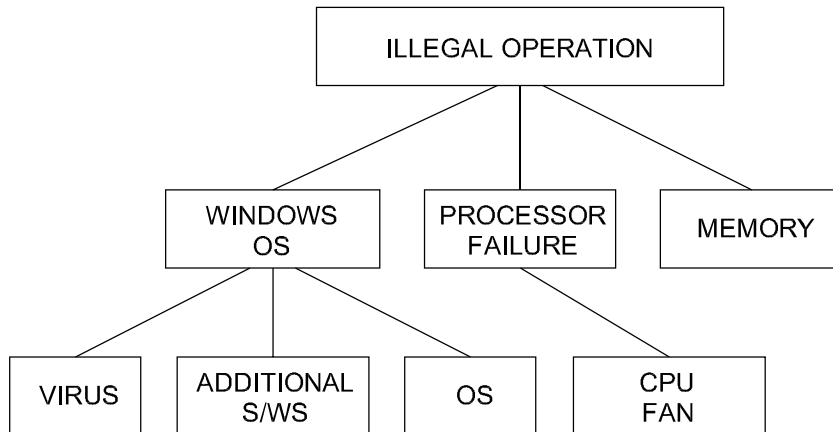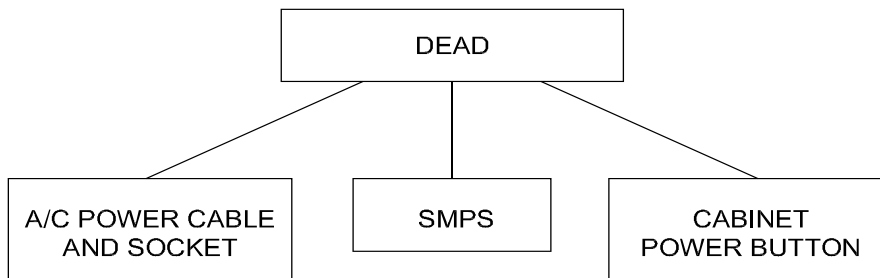
**Discuss the Troubleshooting chart (TSC-01) and Service flow sequence (SFS-01) for the complaint "When windows is started system runs surface test and goes to safemode" referring to exercise 2.33**

**Various faults discussed for the above complaint shall be applied to actual Computer given to you for practical exercises.**

## PROBLEM TREE : **PT- 02**

Observed symptom      : Windows shows "illegal operation"

Additional symptom     : Windows not working

```
                           ILLEGAL OPERATION

        WINDOWS              PROCESSOR              MEMORY
          OS                  FAILURE

   VIRUS      ADDITIONAL        OS            CPU
                S/WS                          FAN
```

Discuss the Troubleshooting chart (TSC-02) and Service flow sequence (SFS-02) for the complaint "While working, windows shows error - illegal operation"

Various faults discussed for the above complaint shall be applied to actual Computer given to you for practical exercises.

## PROBLEM TREE : **PT- 03**

Observed symptom      : DVD  drive can't read

Additional symptom     :

```
                        DEAD

   A/C POWER CABLE        SMPS          CABINET
    AND SOCKET                       POWER BUTTON
```

**IT & ITES : COPA - (NSQF Level - 4): Related Theory for Exercise 1.4.16**

## Application softwares

**Objective:** At the end of this lesson you shall be able to
• **describe various software types.**

**Application software**

Application software is a term which is used for software created for a specific purpose. It is generally a program or collection of programs used by end users. It can be called an application or simply an app.

In fact all the software other than system software and programming software are application software.

**Application software definition**

A software which is developed to help the user to perform specific tasks is called application software.

**The different types of application software include the following:**

| Application Software Type | Examples |
|---|---|
| Word processing software | MS Word, WordPad and Notepad |
| Database software | Oracle, MS Access etc |
| Spreadsheet software | Apple Numbers, Microsoft Excel |
| Multimedia software | Real Player, Media Player |
| Presentation Software | Microsoft Power Point, Keynotes |
| Enterprise Software | Customer relationship management system |
| Information Worker Software | Documentation tools, resource management tools |
| Educational Software | Dictionaries: Encarta, BritannicaMathematical: MATLABOthers: Google Earth, NASA World Wind |
| Simulation Software | Flight and scientific simulators |
| Content Access Software browsers | Accessing content through media players, web |
| Application Suites | OpenOffice, Microsoft Office |
| Software for Engineering and Product Development | IDE or Integrated Development Environments |

There are various different types of application software such as licensed, sold, freeware, shareware and open source.

Application software's either need to be installed or can run online. Application software's can also be distinguished on the basis of usage into the following:

- Utility programs
- Generic programs
- Integrated programs
- Specific software
- Bespoke software
- Word processing software
- Desktop publishing software
- Spreadsheet software
- Database software
- Presentation software
- Internet Browsers
- Email Programs
- Graphic Programs (Pixel based)
- Graphic Programs (vector based)
- Communication software: Communication through audio, video or chat based means

**IT & ITES : COPA - (NSQF Level - 4): Related Theory for Exercise 1.4.17**

# Bluetooth devices

**Objectives :** At the end of this lesson you shall be able to
• **describe the meaning of Bluetooth**
• **describe the method of using Bluetooth**
• **list the major applications of Bluetooth.**

**Introduction:**

Bluetooth is a wireless technology standard for exchanging data over short distances (using short-wavelength UHF radio waves in the range 2.4 to 2.485 GHz) from fixed and mobile devices, and building personal area networks (PANs). It is a standard wire-replacement communications protocol primarily designed for low-power consumption, with a short range based on low-cost transceiver microchips in each device.

It can connect up to eight devices (items of electronic equipment) at the same time. The chip can be plugged into items such as computers, digital cameras, mobile phones and faxes. Bluetooth is particularly convenient in certain situations - for example, when transferring files from one mobile phone to another without cables. Sending music and photos between a PC and a mobile phone is another useful application.

Because the devices use a radio (broadcast) communications system, they do not have to be in visual line of sight of each other, however a quasi optical wireless path must be viable.

Range is power-class-dependent, but effective ranges vary in practice varying from 10 to 100 m.

The name 'Bluetooth' reflects the Scandinavian origins of the technology. It is named after a 10th century Danish viking, King Harald Blåtand (translating as 'Bluetooth' in English).He united and controlled Denmark and Norway, hence the association of uniting devices through Bluetooth.

**Using Bluetooth**

To use Bluetooth, the device must be Bluetooth enabled. For this purpose a device called "Dongle"may be used. A dongle is a device that plugs into the computer to enable it to use Bluetooth. Every manufacturer of compatible devices will have their own instructions for accessing Bluetooth. For detailed instructions you will need to see the manual, but as a general guide:

**To set up Bluetooth:**

(Identify the blue tooth icon on devices.)

1  Turn on, or enable, Bluetooth. Ensure your device is 'visible' and not 'hidden', so other nearby devices can pick up the signal.

2  Give your device a name to identify it when connecting to other compatible equipment.

When devices like mobile phones, laptops, tablets etc. enable Bluetooth the Bluetooth icon is on.

**To establish a Bluetooth connection:**

1  Find the file you wish to send.

2  Select the option to send it via Bluetooth - your device will search for other devices within range and display them.

3  Scroll to the device you wish to connect with and select it.

4  If the other device needs 'pairing', you will need to enter a passcode - a bit like a PIN number - and make sure it is entered on the other device.

When the connection is established, the data will start to send. You do not need worry about a clear line of sight between devices.

**List of Bluetooth applications**

Some of the Bluetooth applications are as follows:

Wireless control of and communication between a mobile phone and a handsfree headset.(Refer fig. 1)



Fig 1

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• Wireless control of and communication between a mobile phone and a Bluetooth compatible car stereo system.

• Wireless control of and communication with tablets and speakers such as iPad and Android devices.

• Wireless networking between PCs in a confined space and where little bandwidth is required.

• Wireless communication with PC input and output devices, the most common being the mouse, keyboard and printer.

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- Transfer of files, contact details, calendar appointments, and reminders between devices with OBEX(Objects exchange).

- Replacement of previous wired RS-232 serial communications in test equipment, GPS receivers, medical equipment, bar code scanners, and traffic control devices.

- Wireless bridge between two Industrial Ethernet networks.

- Wireless controllers in gaming consoles.

- Personal security application on mobile phones for prevention of theft or loss of items. The protected item has a Bluetooth marker (e.g., a tag) that is in constant communication with the phone. If the connection is broken (the marker is out of range of the phone) then an alarm is raised.

## Wi-Fi:

Wi-Fi is a popular wireless networking technology. Wi-Fi stands for "wireless fidelity". The Wi-Fi was invented by NCR corporation/AT&T in Netherlands in 1991. By using this technology we can exchange the information between two or more devices. Wi-Fi has been developed for mobile computing devices, such has laptops, but it is now extensively using for mobile applications and consumer electronics like televisions, DVD players and digital cameras. There should be two possibilities in communicating with the Wi-Fi connection that may be through access point to the client connection or client to client connection. Wi-Fi is a one type of wireless technology. It is commonly called as wireless LAN (local area network). Wi-Fi allows local area networks to operate without cable and wiring. It is making popular choice for home and business networks. A computer's wireless adaptor transfers the data into a radio signal and transfers the data into antenna for users.

And can now generate a system within Resorts, library, schools, colleges, campus, personal institutes, as well as espresso stores as well as on the open public spot to help to make the company much more lucrative as well as interact with their own customer whenever. Wi-Fi compatibility can make surf with stare to company using their inspiring cable television much a smaller amount force down.

The radio signals are transmitted from antennas and routers that signals are picked up by Wi-Fi receivers, such has computers and cell phones that are ready with Wi-Fi cards. Whenever the computer receives the signals within the range of 100-150 feet for router it connect the device immediately. The range of the Wi-Fi is depends upon the environment, indoor or outdoor ranges. The Wi-Fi cards will read the signals and create an internet connection between user and network. The speed of the device using Wi-Fi connection increases as the computer gets closer to the main source and speed is decreases computer gets further away.



Fig 1

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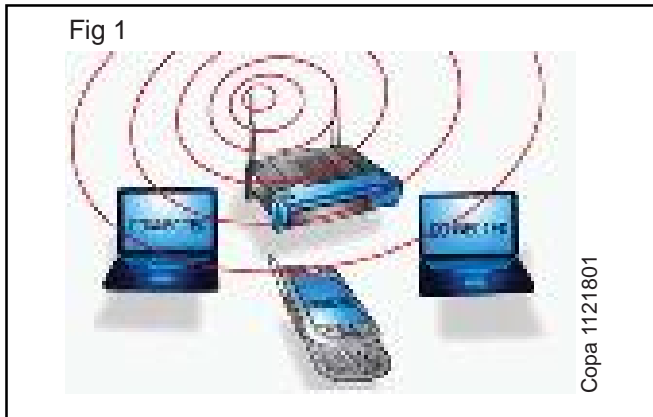
### Working Principle:

Wi-Fi is a high speed internet connection and network connection without use of any cables or wires. The wireless network is operating three essential elements that are radio signals, antenna and router. The radio waves are keys which make the Wi-Fi networking possible. The computers and cell phones are ready with Wi-Fi cards. Wi-Fi compatibility has been using a new creation to constituent within the ground connected with community network. The actual broadcast is connected with in sequence in fact it is completed by way of stereo system surf as well as the worth of wires with monitor to classification prone. Wi-Fi allows the person in order to get access to web any place in the actual provided area.



Fig 2

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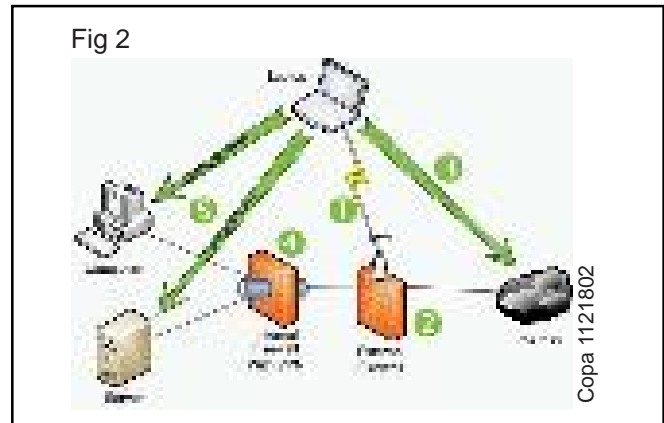
### Security:

Security is impartment element in the Wi-Fi technology. Security is our personal decision but having a wireless connection we should pay attention to protect our private details. We can connect easily to unsecured wireless routers. The problem is any one is connected to thewireless router using the data like download games, download apps and planning terrorist activities, shirring illegal music and movie files etc. So it is necessary to provide security to the wireless technologies based devices.

## DVDs, CDs and burning DVDs

**Objectives :** At the end of this lesson you shall be able to
- **describe the features of CDs & DVDS**
- **describe the main formats of DVDs**
- **describe DVD burning**
- **describe the features of CDs.**

**Introduction**

DVD (sometimes called as "digital video disc" or "digital versatile disc") is a digital optical disc storage format. DVDs can be usedwith many types of players, including PCs and standalone players.

These discs are known as DVD-ROM, because data can only be read and not written or erased. Blank recordable DVD discs (DVD-R and DVD+R) can be recorded once using a DVD recorder and then function as a DVD-ROM. Rewritable DVDs (DVD-RW, DVD+RW, and DVD-RAM) can be recorded and erased multiple times.

**DVD features and formats**

DVDs are used in DVD-Video consumer digital video format and in DVD-Audio consumer digital audio format. They can also be used in a special AVCHD format ( Advanced Video Coding High Definition) often used with AVCHD format camcorders. DVDs containing other types of information may be referred to as DVD data discs.

A typical recordable DVD can hold about 4.7 gigabytes (GB). However, the total amount of disc space that you can use to burn files to the disc is less than the amount that's often listed on the disc itself. This is because the disc capacity is calculated differently when it's used in a computer. For example, a typical DVD-R that has a listed disc capacity of 4.7 GB can only store about 4.37 GB of data on the disc. DVDs offer a storage capacity of approximately 4.7 GB. DVD discs do not deteriorate over time and are unaffected by magnetic fields.

The type of recordable disc to be used depends on a few different factors, such as:

- The types of recordable discs that work with the disc burner.

- The disc drive on the computer or device will read the disc after it is burned.

- The total size of all the files that will be burned on to a disc.

**DVD burning**

The process of recording source material onto an optical disc (CD or DVD) is called burning / writing or optical disc authoring.Creating an optical disc usually involves first creating a disk image with a full file system designed for the optical disc, and then actually burning the image to the disc. Many programs are available as bundled applications to create the disk image and burn the files.

The speed at which a DVD can be written is expressed as a multiplier: 16X means 16 times faster than just playing it. Speeds upto 52X are also very common.

**CD or DVD formats**

For burning DVDs, the two main disc formatsin use are:

- Live File System and

- Mastered disc formats.

**Live File System format :**

Discs that use the Live File System format are often more convenient because you can copy selected files immediately and as often as you want, just like you can with a USB flash drive. This is convenient if you want to keep a disc in your CD, DVD, or Blu ray Disc burner and copy files whenever the need arises. In this format you can copy and erase files over and over again. However, the Live File System optical disc format is only readable by Windows 7, Windows Vista, and Windows XP systems. These discs are not blank after they're formatted.

Discs formatted in this format have the option name in the Burn a Disc dialog box: "Like a USB flash drive."

**Mastered disc formats:**

If we want to create an optical disc that can be used to transfer data files to older versions of the Windows operating system or even to another operating system, weneed to use the Mastered optical disc format. Also if we want to burn music or pictures and use the disc in regular CD, DVD, or Blu ray Disc players that can play MP3 files and show digital pictures, we should use the Mastered optical disc format.

The Mastered format works just like burning CDs in Windows XP. In other words, when we write the disc, we copy a file or a group of files to the optical disc all at once. Once this is done, the disc is closed and we cannot copy more files to the disc nor can we delete the existing files.Hence it is recommended not to copy files immediately; it is a good practice to assemble the entire collection of files that needed to be copied to the disc and then burn them all at once.

Discs formatted with the Mastered option have the option in the Burn a Disc dialog box: "With a CD/DVD player."

There are many types of tools available to create data, music, video and audio discs. We can also create

backups that span across multiple discs, rip music tracks from Audio CDs and create or burn disc images in different formats. They may also provide features like automatic audio conversion from WAV, MP3, FLAC, WMA files, disc copying, compressed file backup and restore, disk erasing, VCD/SVCD support, project burning etc..

**Blu - ray Discs**

Blu-ray, also known as Blu-ray Disc (BD) is the name of a new optical disc format that is rapidly replacing DVD. The format was developed to enable recording, rewriting and playback of high-definition video (HD), as well as storing large amounts of data. The format offers more than five times the storage capacity of traditional DVDs and can hold up to 25GB on a single-layer disc and 50GB on a dual-layer disc.

The name Blu-ray is derived from the underlying technology, which utilizes a blue-violet laser to read and write data. The name is a combination of "Blue" (blue-violet laser) and "Ray" (optical ray). They are referred to as "Blu-ray" discs or BDs.

The following formats are part of the present day Blu-ray Disc specification:

1 BD-ROM - read-only format for distribution of HD movies, games, software, etc.

2 BD-R - recordable format for HD video recording and PC data storage.

3 BD-RE - rewritable format for HD video recording and PC data storage.

At present, a single-layer disc can hold 25GB and a dual-layer disc can hold 50GB. Over 9 hours of high-definition (HD) video on a 50GB disc. About 23 hours of standard-definition (SD) video on a 50GB disc.

**IT & ITES : COPA - (NSQF Level - 4): Related Theory for Exercise 1.4.20**