







Participant Handbook









Skilling India in Electronics

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Shri Narendra Modi Prime Minister of India







Certificate

COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARD

Is hereby issued by the

Electronics Sector Skills Council of India

for

Skilling Content: Service Engineer

Complying to National Occupational Standards of

Job Role/QP: Service Engineer, QP No: ELE/Q4607 Level 5

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Authorized Signatory
Electronics Sector Skill Council of India

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I would like to take the opportunity to thank everyone who contributed in developing this handbook for the QP Service Engineer.

The handbook is the result of tireless pursuit to develop an effective tool for imparting the Skill Based training in the most effective manner.

I would like to thank the team of KontentEdge for their support to develop the content, the SME and the team at the ESSCI along with the industry partners for the tireless effort in bringing the handbook in the current format.

CEO

Electronics Sector Skills Council of India

About this Book

This Participant Handbook is designed to enable training for the specific Qualification Pack (QP). Each National Occupational (NOS) is covered across Unit/s.

Key Learning Objectives for the specific NOS mark the beginning of the Unit/s for that NOS.

- Describe support services and role of a service engineer
- Explain the basics of computers, operating system and other related software
- Describe basics of networking, Internet and Web browser
- Identify the faulty module and perform troubleshooting
- Analyse the error codes and messages
- Implement maintenance and repair
- Execute assembling and disassembling of computers
- Explain E-waste management
- Identify the work processes at customer's facility
- Manage and resolve issues at the facility
- Explain the importance of managing assets and warranty
- Identify the tools to monitor the system
- Describe the maintenance schedules and records
- Recognize the organizational goals and targets
- Communicate with superior and subordinates
- Manage Cross-functional interaction to accomplish productivity
- Achieve inter-personal communication
- Recognize the organizational goals and targets
- Communicate with superior and subordinates
- Manage Cross-functional interaction to accomplish productivity

Symbols Used



Key Learning Outcomes



Steps



Role Play



Tips



Notes



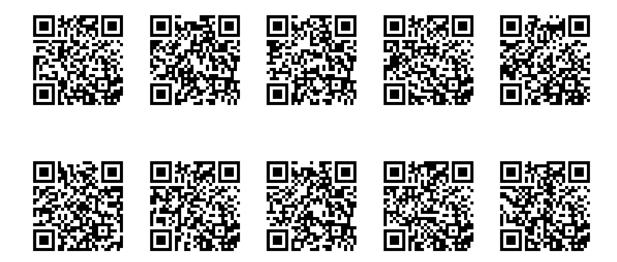
Unit Objectives



Activity

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1. Basics of IT Hardware System

Unit 1.1 – Introduction to Service Engineer

Unit 1.2 – Basics of Computer

Unit 1.3 – Operating System and Other Software

Unit 1.4 - Basics of Networking

Unit 1.5 – Internet and Web Browser



Key Learning Outcomes



At the end of this module, you will be able to:

- 1. Describe support services and role of a service engineer
- 2. Explain the basics of computers, operating system and other related software
- 3. Describe basics of networking, Internet and Web browser

UNIT 1.1: Introduction to Service Engineer

Unit Objectives



At the end of this unit, you will be able to:

- 1. Identify support services
- 2. Describe IT hardware service engineer
- 3. List components of IT hardware system

1.1.1 Support Services

Support services are the services that addresses problems with a service or product sold to a customer. This may involve maintenance of the product as well. These services can be provided through an e-mail, a tool where users can log a call or error, or a live support software on a website. Larger organizations frequently have internal technical support available to their staff for handling computer-related problems, network related problems and so on. The following figure shows different ways in which support services can be provided:



Fig. 1.1.1: Different ways in which support services can be provided

Alternatively, support services are provided either at site or remotely. The following figure shows the two ways in which support services can be provided:



Onsite Services
• Providing services at the doorstep



Offsite Services
• Providing service remotely

Fig. 1.1.2: Providing support services at doorstep and remotely

Companies hire service engineers to provide the support services to customers facing difficulty with the equipment and do not have appropriate knowledge to fix it.

1.1.2 Service Engineer

Service Engineer is responsible for attending to problems to resolve or perform maintenance functions by visiting client or remote locations. This person assess and then install or fix the equipment or machinery. A service engineer provides support and service in different fields such as, IT, Biomedical and so on.

An IT Hardware service engineer provides hardware and related software service and maintenance which may include installation or repair of hardware equipment or related software by checking, troubleshooting and substituting faulty modules. This person carries out repairs and installations at customer sites. They are needed when customer requires their expertise and services. They may perform scheduled maintenance to prevent mechanical malfunction; they may also be called in to make repairs when equipment fails unexpectedly. This person works as a devoted engineer at customer premises or remotely.

The following image shows an IT hardware service engineer:



Fig 1.1.3: An IT hardware service engineer

This person:

- Monitors and manages the IT hardware systems such as end-user computing, server and storage administration, network operations for maintaining minimal downtime
- Has knowledge of working on various IT products and analytical
- Works at customer's facility and guarantees a downtime of less than 1% in IT
 Hardware systems and related software by checking, troubleshooting and
 substituting faulty modules.
- Monitors customer's critical hardware systems remotely.

1.1.3 IT Hardware System

An IT hardware system mainly consists of:

- 4. Computer and peripheral devices
- 5. Related software
- 6. Network and network devices

The following figure shows various ways in which IT hardware system can be managed, monitored and maintained:



Fig. 1.1.4: Various ways of managing and monitoring hardware system

UNIT 1.2: Basics of Computer

Unit Objectives



At the end of this unit, you will be able to:

- 1. Define computer and types of computer
- 2. Identify the basic hardware and related software required in a computer
- 3. Describe the importance of computer maintenance



1.2.1 Computer and Types of Computer

A computer is an electronic device which transforms data into meaningful information. The following figure shows a computer:



Fig. 1.2.1: Computer

Its basic functionality irrespective of its size or make is shown in the following figure:



Fig. 1.2.2: Function of a computer

The main features of a computer are accuracy, high speed, versatility, diligence, and storage. There are four functional units in a computer which are:

- 7. **Input unit**: This unit accepts data or instructions from the user for processing by using input peripheral device.
- 8. **Storage unit**: This unit stores data and instructions before and after processing. It is mainly divided into two parts, primary storage and secondary storage.

- Central processing unit: This unit processes data, taking them from storage unit based on the specified instructions and the data type provided. It is then sent back to the storage unit. CPU includes arithmetic logic unit (ALU) which helps in performing calculations using arithmetic operators like addition (+), subtraction (-) and so on. It also uses comparison operators like > (greater than), < (less than) and = (equal to). Control unit controls all these operations, enables retrieving data from storage and helps store information back to a storage device.
- 9. **Output unit**: This unit is used for displaying the result to the user in the required format by using output peripheral device.

The following figure represents a block diagram of the functional units of a computer:

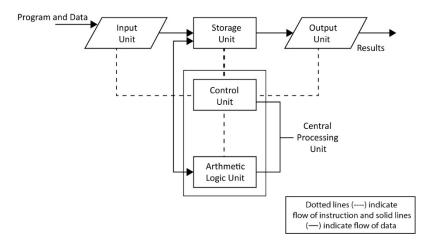


Fig. 1.2.3: Functional units of computer

Peripheral Device

Peripheral devices are input/output devices that are used for entering instructions and information into a computer to store or process and to deliver the data to user.

Any device providing input to a computer is known as input device. There are many input devices such as a keyboard and mouse. An output device is used to present the information received from CPU in required format to the user. The processed data, that is stored in the memory, is transferred to the output unit. The output unit then converts the data into a user-friendly format. The output is typically presented either on a display device such as a monitor, or on paper (hard copy) with the help of a printer.



Peripheral devices may also be referred to as auxiliary devices.

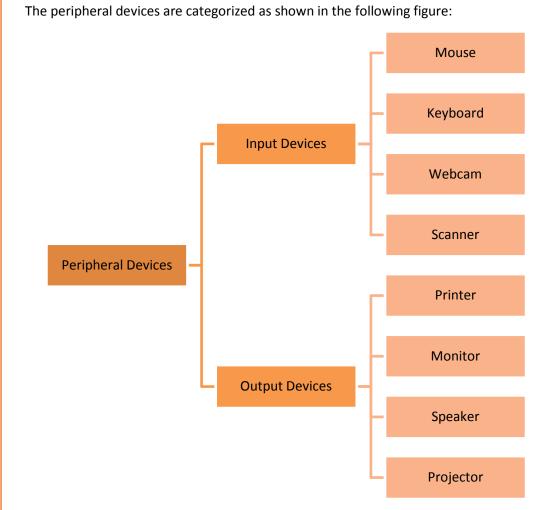


Fig. 1.2.4: Peripheral devices

Storage Unit or Memory

Storage unit or memory, often called computer data storage, stores the data inside the computer. Data is manipulated by the CPU that performs all calculations and storage unit holds that data. Two types of storage are:

- Primary storage, also referred to as internal or main memory, includes random access memory(RAM), cache and read only memory (ROM) which are directly accessible to the CPU for reading instructions. The following list describes different types of main memory:
 - RAM stores frequently used data and instructions to speed up the operation of the CPU. It is a temporary memory in which data is lost if the source of power is switched-off.
 - Cache is a high speed memory area reserved for main memory or storage devices to further speed up the CPU operations.
 - ROM is a non-volatile memory which stores firmware (software related to hardware) or application software. It stores all the basic programs required to start

the computer (boot the computer). This type of memory cannot be easily overwritten or modified.

 Secondary storage is also referred to as auxiliary/external memory. It includes hard disk, optical disks, flash drive and so on which cannot be accessed by the CPU.
 Computer uses input output devices to access this type of storage.

Types of Computers

Computers can be classified according to their size, speed and computing power. The following table lists the different types of computers:

Type	Description	Image
Microcomputer	It is a single user computer system with a single chip and moderately powerful microprocessor. The different type of microcomputers are: Desktop Computer Laptop Computer Notebook Tablet	Image
Work Station	It is like a single user PC, having a microprocessor that is more powerful.	
Mini Computer	It is a computer system that can support multiple users simultaneously and has more powerful processors than a microcomputer. They are also called mid-range computers.	

Main Frame	It supports multiple users and it is like a minicomputer but the software technology is different from that of a minicomputer. They are used to handle and process large amount of data such as in banks and government offices.	
Super Computer	It is the fastest and the most expensive computer system, used for complex scientific computations and numerical calculations such as weather forecasting, nuclear simulations and in the field of astrophysics.	

Fig. 1.2.5: ypes of computers

Based on their usage, the computers are further classified as:

- Laptop
- Desktop

Laptop Computer

It is a battery or AC powered wireless and portable computer, usually smaller than briefcase in size. It contains "clamshell" form factor and a thin LED/LCD screen on the upper side and alphanumeric keyboard attached on the lower part of the "clamshell".



Using a docking station, a laptop can be effectively converted into a PC. A docking station is hardware frame supplying connections for peripheral devices like monitor or printer.

The following figure shows a laptop and internal view of the laptop:

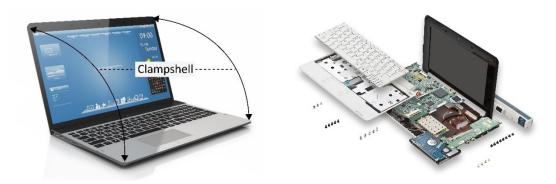


Fig. 1.2.6 Exterior and interior of a laptop computer

Desktop Computer

It is a PC designed to be used at a single place preferably on a desk or table because of its power and size requirements. Unlike a laptop, they are not portable or wireless. A desktop PC has a base unit along with a computer's modules. The latest models in the market have a base unit attached to the monitor for saving space. Desktops usually cost less than laptops but have greater life span. The following figure shows a desktop computer with internal view of the base unit:

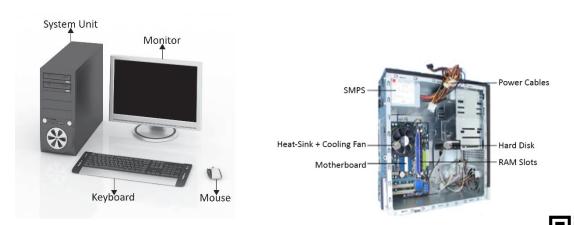


Fig. 1.2.7: Exterior and interior of a desktop computer

1.2.2 Computer Hardware

Computer hardware includes the parts of computer that can be easily seen and touched. The computer's internal hardware parts are called components, whereas peripherals are the external hardware devices such as the keyboard, mouse, audio speakers and printers.



Hardware includes not only the computer and related devices but also the cables, connectors and power supply units. It is directed by the software to execute the commands or instructions.

The following figure shows a snapshot of basic computer hardware:

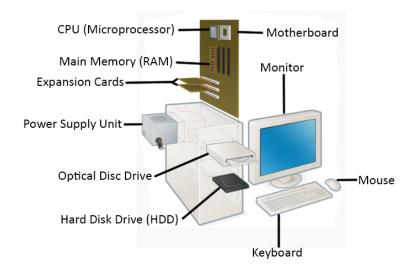
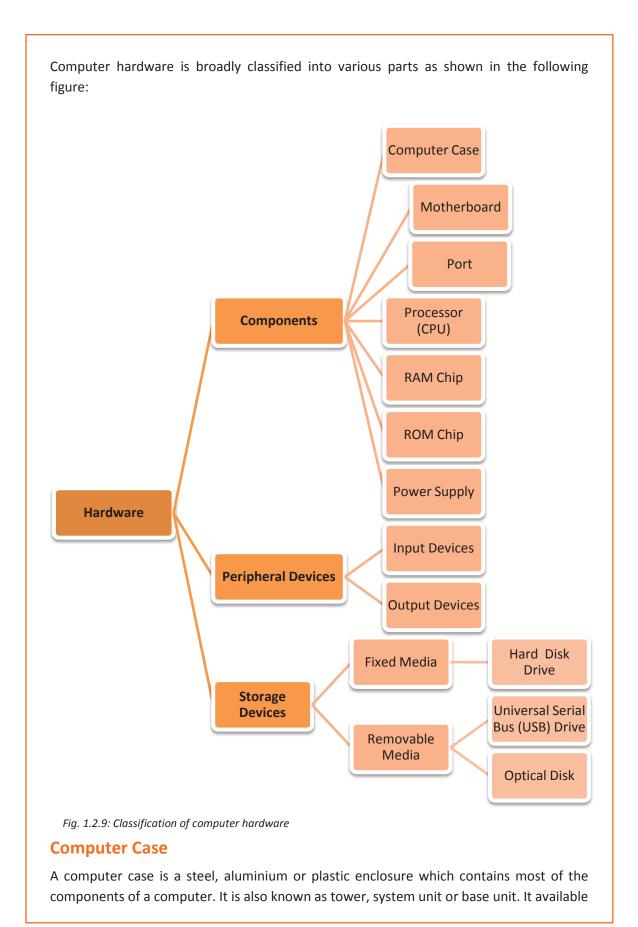


Fig. 1.2.8: Basic computer hardware



in different sizes and shapes. To attach the components, a case has screws, slots and attachment points.

Motherboard

A motherboard is the primary printed circuit board (PCB) in a computer which grips the microprocessor, provides sockets and slots to hold the other parts of the computer and attach the electronic components to the power supply. It is also called as a system board or main board, which allows the components to interface with each other, making it a complete working unit. It also has a provision for initial set up of computer after power is turned on, which is called BIOS or boot firmware. The motherboard also provides slots and provision to insert expansion cards. Sometimes, a secondary daughter board is connected to the motherboard to provide further expandability or to satisfy space constraints.

The following figure shows a labelled motherboard:

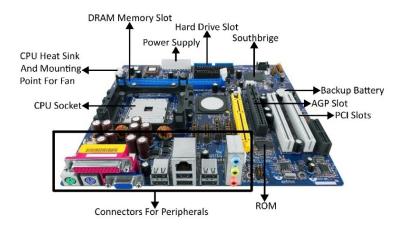


Fig. 1.2.11: Motherboard

The motherboard also contains a small battery and the chips for storage in the system for some time and few other computer settings. There are different categories of CPU chips present in motherboards as shown in the following table:

CPU chip	Input	Processing Unit	Output
8088 CPU	inputs 8 bits of data	Processes 8 bits of data	Outputs 8 bits of data
80286 CPU	inputs 16 bits of data	Processes 16 bits of data	Outputs 16 bits of data
80386SX CPU	inputs 16 bits of data	Processes 32 bits of data	Outputs 16 bits of data at a time

80386DX CPU	inputs 32 bits of data	Processes 32 bits of	Outputs 32 bits of
		data	data
80486SX CPU	inputs 32 bits of data	Processes 32 bits of	Outputs 32 bits of
		data	data
80486DX CPU	inputs 32 bits of data	Processes 32 bits of	Outputs 32 bits of
	h	data	data
		data	data
'586 CPU	inputs 32 bits of data	Processes 32 bits of	Outputs 32 bits of
		data	data
Pentium/P6/K5	inputs 64 bits of data	Processes 64 bits of	Outputs 64 bits of
CPU		data	data
Pentium Pro CPU	inputs 64 bits of data	Processes 64 bits of	Outputs 64 bits of
		data	data

Fig. 1.2.12: CPU chips

Slots

Slots offer an opening or a socket on the motherboard used for insertion of a circuit board/expansion card that offers more features like advanced graphics, sound, video or memory. An expansion card has edge connector that fits accurately into expansion slot and row of contacts row. The row of contacts is intended to create an electrical connection among motherboard and integrated circuits of the cards. There are seven slots for expansion based upon physical arrangement of the motherboard's case. Some of the slots are:

- 4. **CPU Slot**: The CPU slot (referred as CPU socket) allows the CPU chips to be inserted on the motherboard.
- 5. **RAM Slot**: RAM slots on the motherboard provide slots for inserting RAM chips. These can be easily removed and replaced.
- 6. **Peripheral Component Interconnect (PCI) Slot**: It is utilized for expansion devices such as modems, radio tuners, television tuners, and sound/video cards.
- 7. **PCI Express Slot**: Similar to PCI slot, it is used to insert expansion cards. It allows higher speeds for transferring, and hence are most sought for graphic cards. The accelerated graphics port(AGP) has been replaced by PCI express as a primary slot.

Expansion Card

The circuit boards which are inserted in the slots are called expansion cards. These expansion cards enable a computer to communicate with a variety of input/output devices by connecting to it.

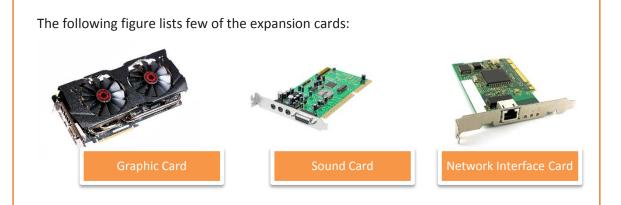


Fig. 1.2.13: Types of expansion cards

Port

Port serves as an interface between the computer and peripheral devices and other computers. Ports depend on kinds of equipment that are to be connected. The following image displays various ports in a system unit:

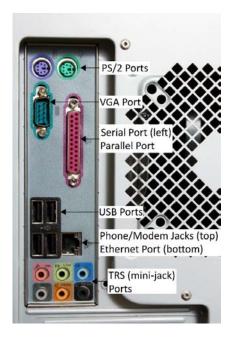


Fig. 1.2.14: Types of ports

There are various ports present in the computer, namely:

- Serial Port: A 9 pin connector is used with this port. It is no longer in use. It was earlier used for modems, mouse, printers, and various digital devices.
- PS/2 Port: This port was used to connect keyboards and mouse to computers. These
 were round ports for six pin connectors. They have now been replaced with USB
 ports.
- Parallel Port: These ports are very similar to serial ports and were used to connect printers and joysticks. They are no longer in use and have also been replaced by USB ports. A common parallel port is used for 25 pins connector.
- Video Graphics Array (VGA) Port: Projectors and monitors are connected via VGA port having a 15 pin connector in three rows.
- USB Port: The USB port is now the most common port in a computer used to connect
 mouse, keyboard, printer, and an external storage device like a DVD-RW drive and
 flash drive to a computer.
- TRS: Tip, ring and sleeve (TRS) ports are also called ports for audio/mini-jacks. They
 are commonly used to connect audio devices such as headphones and microphones
 to computers.
- Ethernet: It is a port, a little broader than the one used for network connections. For network connections, CAT5 and fast transmission network cable is used. The port is standard for wired network computers. A narrow port meant for a phone jack is also available in some computers. They are used to connect modems over telephone lines.

RAM Chip

Random access memory (RAM) is the short term memory in a computer used to store documents while they are being processed. It is available as a RAM chip. This RAM chip is an integrated circuit (IC) soldered on the motherboard. The two types of RAM are, static RAM (SRAM) and dynamic RAM (DRAM). SRAM is more expensive to produce, is faster and requires less dynamic power than DRAM. SRAM is often used as cache memory for the CPU.

ROM Chip

Read-only memory (ROM) is a type of non-volatile memory used in computers and other electronic devices. It is available as a ROM chip. This ROM chip is an IC soldered on the motherboard. There are five basic types of ROM, namely:

- ROM Read Only Memory
- PROM Programmable Read Only Memory
- EPROM Erasable Programmable Read Only Memory
- EEPROM Electrically Erasable Programmable Read Only Memory
- Flash EEPROM memory

Power Supply Unit (PSU)

PSU converts the AC power to low voltage DC (Direct Current) power, vital for the internal components of the PC. The following figure shows a PSU:



Fig. 1.2.16: Power supply unit

Mouse

A mouse is hand-operated device and is also known as a pointer. It enables the user to control objects on the computer screen. A mouse is either wireless or wired, and uses either a ball or laser to move. The movement on mouse sends instructions are to system allowing the cursor to move on screen. It enables the cursor to interact with software elements, files and folders. Different forms of a mouse are:



Fig. 1.2.17: Types of mouse

A mouse is an important computer hardware that is external to system housing.

Keyboard

A primary input device, keyboard resembles a typewriter but with a few extra keys. The following figure shows an alphanumeric keyboard:



Fig. 1.2.18: Alphanumeric keyboard

Keyboards enable typing text by letting a person to input numbers, letter and symbols. The keys in keyboards can be categorised as shown in the following figure:

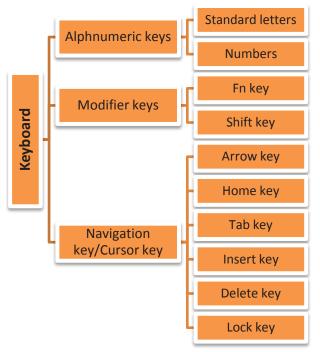


Fig. 1.2.19: Hierarchical structure of keyboard keys

The standard keys usually found on computer keyboards can be categorised as follows:

- Alphanumeric keys: The standard letters and numbers
- Punctuation keys: The comma, period, semicolon, and similar keys
- Modifier keys: Are special keys that modify the normal action of another key, when the two are pressed in combination and are categorised into
 - Function key (Fn key)
 - Shift key

- Navigation/cursor keys: Comprises of a range of keys that enables the cursor to move to different positions on screen:
 - Arrow keys enable the cursor to move in a specific direction. Page scroll keys i.e.
 Page Up/Down keys allow the page to be scrolled up and down.
 - Home key places the cursor to the point where a line begins and End key places the cursor at a point where line ends.
 - Tab key lets the cursor jump to the next tab stop.
 - Insert key allows switching between overtype and insert mode. Overtype mode enables a user to over write text on/after the current location of cursor. The insert mode, places a character at the existing position forces the characters past one position further.
 - Delete key removes the characters ahead of position of the cursor is positioned and moves the following characters to the space available after deletion.
 Similarly, Backspace key deletes characters that are preceding to the cursors position. As per the settings done, Lock keys lock a part of the keyboard.
 - Lock keys are distributed on a keyboard. There are three LEDs above the numeric pad, that indicate the enabled locks. Scroll lock, Num Lock and Caps Lock keys are examples of lock keys.

Webcam

Webcam is a video camera which streams real time image through a computer to a network. The video data/stream may be saved, viewed and sent via the Internet. Webcams are used for video conferences, video chats, video broadcasting, and security surveillances and so on.



Fig. 1.2.20: Webcam

Scanner

A scanner reads documents (text and photographs) and stores it in the computer to which it is connected. The physical document is converted to digital format after it gets scanned. The digital document can be viewed and modified on a computer. Software need to be installed on the computer for scanners to work. Basic scanning software allows the user to import data from a scanner.

Scanners with flat scanning surface are suitable for books, pages, photographs and so on. The following image shows a scanner:

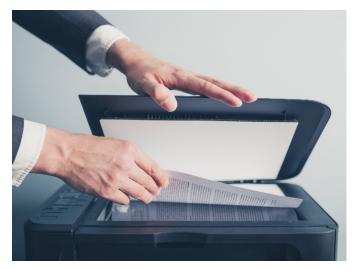


Fig. 1.2.21: Scanner

Printer

Printer is a peripheral device which makes a persistent human-readable representation of graphics or text on paper or similar physical media. They are a great resource but they should be used in a controlled way. Their overuse puts unnecessary wear on them, and also uses up expensive ink and paper. There are four types of printers:

- Personal printers: It is a printer connected to a single system and designed to cater individual users. They are meant for basic printable materials that requires a minimal setup.
- Networked or shared printers: It is a printer designed for high speed printing as well as catering a higher volume of print outs. Many systems can be connected to it. The print speed ranges 45-100 ppm. 120ppm can be achieved by Xerox 9700.
- Virtual printer: A printer that allows creation of files that presents an image of data
 which require to be printed. It is actually a software whose API and user interface is
 similar to a printer driver interface but it is not connected to a computer printer.
- . 3D printer: It helps to create a three-dimensional object from electronic data or a 3D model using additive processes where different layers of a material are placed atop each other under computer control. It is known as printer by analogy with an inkjet printer that deposits a layer of ink on paper to produce a 2D document.

Monitor

The monitor is an output device, also called a visual display unit (VDU) that shows the graphical and textual information of the computer. There are different types of monitors such as, cathode ray tube (CRT), the liquid crystal display (LCD) and the touch screen display.

The following images show a CRT monitor and an LCD monitor:

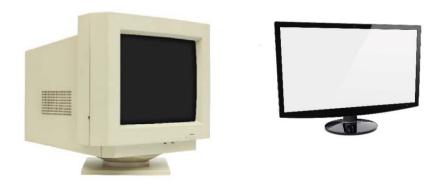


Fig. 1.2.22: Monitor

Speaker

Speakers receive audio signals as input from the sound card of the computer and produce them in the form of sound waves as audio output.: The following figure shows speakers



Fig. 1.2.23: Speakers

Storage Devices

Storage devices, also called storage media, are hardware devices which are used to store data or information. It can store information temporarily or permanently. These devices can be added to computers externally or internally. Storage devices are of two types:

- Magnetic storage includes hard disk drive, magnetic tapes, floppy drive and so on.
- Optical storage includes CD-R, CD-RW, Blue ray disk and so on. It uses laser ray or light to
 access data in it.

Hard Drives

A hard disk is a http://www.computerhope.com/jargon/n/nonvolat.htm hard drive is collection of one or more disks or platters shielded with magnetic material to which data is written with the help of a magnetic head. Some of the hard disks are connected to the motherboard using special cables, and they are powered by a power supply unit.

The following images shows hard disk drives:





Fig. 1.2.24: Hard disk drives

Removable Storage Devices

Computer also has disk drives that are removable. These are listed in the following figure:

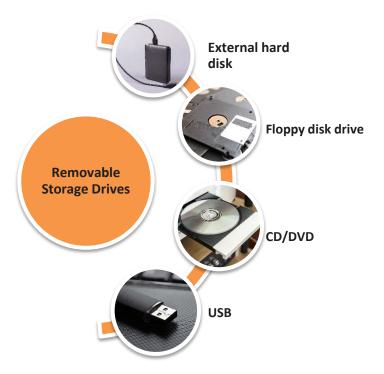


Fig. 1.2.25: Types of removable storage drives

External Hard Disk

External hard drive is portable device which can be connected to a computer through a USB connection or a wireless network (Wi-Fi). These hard drives have high storage capacities. These storage devices are used to back up the computer data or to serve as a network drive.

Floppy Disk Drive

Floppy disk drive was a common storage device and can be still found in many old desktop computers. Floppy disks can be read and written with the help of a floppy disk drive. A floppy disk is thin and flexible magnetic storage, sealed in a plastic enclosure of rectangular shape. Floppy disks are available in different sizes:

- 8-inch (200 mm)
- 5¼-inch (133 mm)
- 3½-inch (90 mm)

Compact Disk/ Digital Video Disc (CD/DVD)

CD/DVDs are types of optical drives which use electromagnetic waves or laser light to read and write data. Different types of CD/DVD are:

- R CD/DVD where R stands for recordable. CD/DVD can be written once and read many times.
- RW CD/DVD where RW stands for read/write.
- ROM CD/DVD where ROM stands for read only memory. ROM CD/DVD allows reading of data which is already present on the CD.

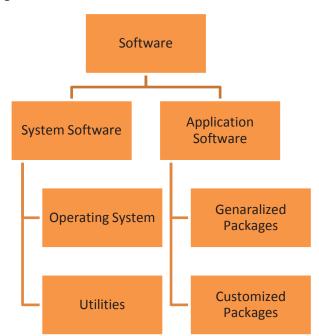
USB

USB stands for universal serial bus. It is a small external, removable and rewritable drive that can be used in any computer which has a USB port. USB flash drive which is used for storing data, consists of an integrated USB interface and a flash memory.

1.2.3 Software -

Software is a set of instructions or programs instructing a computer to perform specific tasks.





The following figure shows classification of software based on it use:

Fig. 1.2.26: Classification of software

System software are sets of programs, which help in running the computer, controlling the various operations of computer systems and managing computer resources such as peripheral devices and other applications. The system software is classified as follows:

- Operating System: A software that provides a user interface allowing communication
 with the computer. It helps in management of hardware devices, maintenance of disk
 file system and support application programs. Windows, UNIX and Linux are the most
 common operating systems.
- Utilities: These are the system software which help in analysing, configuring, optimizing or maintaining computer and computer resources such as anti-virus software, zip/unzip software, disk defragmenter and file manager.

Application software is a set of programs to perform specific tasks, for example, hospital management system, which is an application software to handle all the processes in a hospital. The application software is classified as follows:

- Generalized packages: Are user friendly software such as Word processing software for preparing documents (MS-Word), spreadsheets for data analysis (MS-Excel)
- Customized packages: Are application software that are developed or customized as per a specific requirement such as inventory control or a payroll system

1.2.4 Computer Maintenance

Computer maintenance helps to prevent computer and other hardware devices from getting damaged because of dust or harmful virus programs.



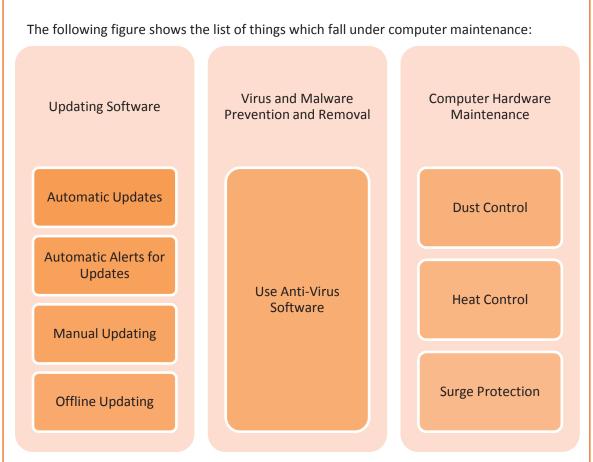


Fig. 1.2.27: Computer maintenance

Nowadays, laptops are more in demand because of their portability but they are more prone to hardware problems because of its portability. Laptop users need to follow the instructions for the correct way of picking the laptop as laptops need to be handled more carefully than the desktop. For example, AC adaptor port, found at the back of a laptop can get damaged as it is easy for the user to unintentionally place pressure on it while forcing it against the table top. The screws in the laptop need to be tightened from time to time.

For an IT system to run efficiently, it is not only the computer maintenance that needs attention but also the peripheral maintenance.

Activity



Choose the correct answer for the following questions.

- 1. Which of the following port is used for connecting headphones to the computer?
 - a. Parallel ports
- b. TRS ports
- c. USB ports
- 2. Which of the following memory is non-volatile in nature?
 - a. RAM
- b. ROM
- c. Cache
- 3. Which of the following keys is a modifier key?
 - a. Tab
- b. Shift
- c. Arrow

Activity 3



Match the followings.

- **Control Unit**
- Key board 2.
- 3. MS Word
- Floppy disk
- 5. Windows

- a. Input device
- b. Application software
- System software
- d. CPU
- e. Magnetic Storage

Unit 1.3: Operating System and Other Software

Unit Objectives



At the end of this unit, you will be able to:

- 1. Define operating system
- 2. List the functions of operating system
- 3. Describe the software in relation to IT hardware maintenance

1.3.1 Operating System (OS)

An OS is a system software that serves as an interface between applications and the hardware. It manages hardware and software resources to facilitates the users with services, except the firmware such as ROM BIOS. Apart from giving a user interface to the user, it performs tasks like memory management, process management, file management, and controlling input/output devices. The following figure shows a block diagram of a computer with respect to the operating system:

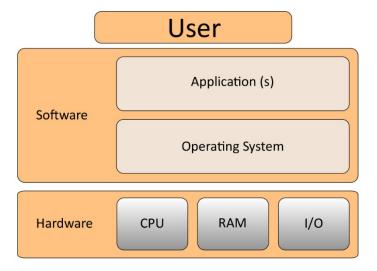


Fig. 1.3.1: Block diagram of a computer with respect to the operating system

The operating system architecture or framework is broadly classified into kernel mode and user mode as shown in the following figure:

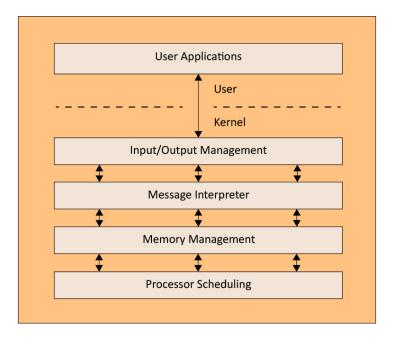


Fig. 1.3.2: Operating system architecture or framework

Kernel that is the core of the OS, is the first program which is loaded in the system at when it is turned on. It then supports the start-up process and handles the hardware. In kernel mode, CPU instructions are executed and memory is referenced for storing data. A crash of kernel stops the functioning of the computer system.

In contrast, the CPU instruction, codes or programs running in the user mode has no direct access to hardware or memory. They request the system APIs (application programing interface) to access hardware or memory. Because of a layer of system API, user mode is recoverable in case a crash happens. Most of the code running on your computer will execute in user mode.



API: A set of functions or procedures which serves as building blocks to develop software applications. For example, a YouTube API enables a programmer to use YouTube application as part of a customized application or website being developed.

The following figure shows some vital functions of an OS: Provides a user interface like graphical user interface (GUI) User interface and command line (text based) • Handles system resources such as computer's memory and Resource sharing of the central processing unit (CPU) time by various Management applications or peripheral devices Keeps track of primary memory usage such as, in use by whom, what parts are not in use. • Does priority-wise memory allocation for a process request in Memory Management case of multiple programs being executed. • De-allocates the memory when a process no longer needs it or has been terminated. Keeps track of processor and status of process with the help of a program known as traffic controller. Processor Management Allocates the processor (CPU) to a process. •De-allocates processor when a process is no longer required. •Keeps track of all devices with the help of a program known as the I/O controller. Decides which process gets the device when and for how Device Management much time. • Allocates the device in an efficient way. De-allocates devices. • Keeps track of information, location, uses, status and File Management maintains the file system. • Enables use of passwords to prevent unauthorized access to Security data or the system System Manages system performance such as recording delays Performance between a request for a service and response from the system Management Assigns software such as, compilers, interpreters, assemblers Coordination and other software to the computer systems, other software and users • Enables network communication by establishing connection Communication between network devices and computer or any other program Provides debugging and error detecting aids and gives **Error Detection** appropriate error messages

Fig. 1.3.3: Functions of operating system

Functions of an Operating System

Components of OS

There are various components or elements within the layers of an operating system architecture to enable a computer to function. To access any hardware, all the software, be it user software or system software, needs an operating system as an interface.

The following figure shows the elements of an operating system:

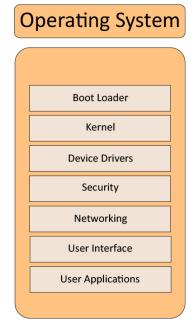


Fig. 1.3.4: Elements of an operating system

Boot Loader

A boot loader is a type of program that loads and starts an operating system when a computer is turned on.

Kernel

Kernel provides basic control over all the computer hardware components with the help of device driver and firmware. It manages access to memory for processes residing in the RAM. Kernel also decides which hardware resources are to be accessed by which processes.

Device Driver

A device driver is a program which helps to operate a particular device attached to a computer. It provides a software interface to the hardware components. The device driver enables the operating system and other programs to access the functions of the hardware devices without worrying about the precise details of the components.

Security

The security of a computer depends on various technologies working properly. An OS provides access to the resources available to software which are running on the system, and also to the external devices such as networks through the kernel. The OS contains various built-in tools, such as antivirus utilities and firewall set up, for protecting the system against security threats.

Networking

Most OS support a number of networking protocols, hardware, software and other applications for facilitating communication over the network. Computers having

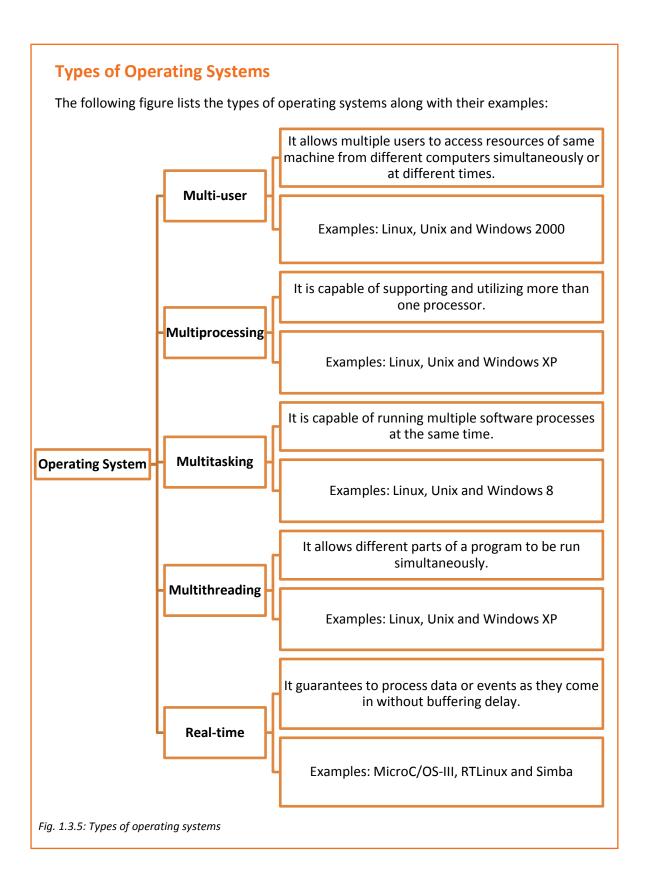
dissimilar OS can participate in a network for sharing various resources such as files, printers and scanners via a wired or wireless connection.

• User Interface

It provides a medium for the users to interact with the system components.

User Applications

User applications are computer programs which are designed to perform a number of coordinated functions, activities and tasks





Many operating systems may fall in more than one category of operating system.

Some other types of OS are as shown in the following figure:

Distributed

Library

Templated

Simple Batch
System

Fig. 1.3.6: Other operating systems

1.3.2 Commonly-used OS

The three most commonly used operating systems for personal computers are Microsoft Windows, Mac OS, and Linux.

Microsoft Windows

Windows is an OS which is owned by Microsoft. It is different from any open source software in the sense that only Microsoft can make changes to the code. It can be installed on different kinds of computers, manufactured by various competitors, giving a wide range of choice for hardware to the user.

The latest version Windows 10 includes touchscreen support. This combines the usability of a touchscreen tablet and the power of a desktop computer. It also includes the "Play To" and "Remote Media Streaming," features that allow a user to play media from his/her computer on another device. These features also allow the user to access media when he/she is away from his/her computer.

Architecture

A processor running Windows OS has two modes:

- user mode
- kernel mode

Depending on the type of code running, the processor switches between the user and kernel modes. The application programs run in user mode, and core OS components run in kernel mode. Most of the drivers run in kernel mode.

The Windows hardware abstraction layer is an interface between the physical hardware and the rest of the OS. It hides differences in hardware components and provides a

consistent platform for the kernel to run. This layer includes hardware-specific code which controls multiple processors, I/O interfaces and interrupt controllers.

The following figure shows the architecture of Windows OS:

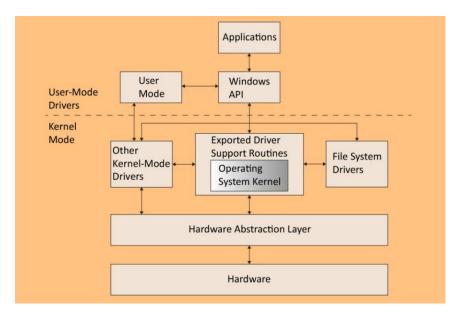


Fig. 1.3.7: Architecture of Windows OS

Directory Structure

The root directory in Windows OS is represented as "drive:\". For example, the root directory is generally "C:\". The directory separator is a "\", but the OS also recognizes a "/" internally. The following list shows the folders which appears in the root of a Windows OS.

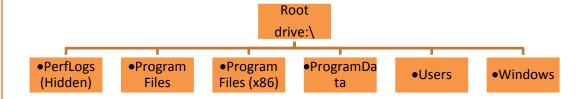


Fig. 1.3.8: Windows directory structure

Utilities

Utilities of Microsoft Windows depends on the version a user is using. The following figure lists some common utility tools for Windows as per the latest version of the operating system:

Windows Default Utility Applications

Windows 10

Language Packs

Microsoft Office

Device Drivers

Developer Tools

Windows Essentials

Windows 8.1

Bing Toolbar

Microsoft Camera Codec Pack

Language Packs

Windows Phone for Desktop

Windows 7

Silverlight

Skype for Windows

Device Drivers

Microsoft Office

Disk Cleanup

Fig. 1.3.9: Common window utility tools

Configuration/Installation

Following figure shows the steps that should be performed in order to install windows operating system on a computer:

Start the computer

Enter the BIOS's boot options menu.

Select the CD-ROM drive as the first boot device of your computer.

Save the changes of the settings and shut down the system.

Switch on the power of the PC and the insert the Windows disc into your CD/DVD drive.

Fig. 1.3.10: Steps to install windows operating system

Mac OS

MacOS which was known as Mac OS X earlier, is Unix-based graphical OS developed by Apple Inc. and is designed to be run on Apple's Macintosh computers. After Microsoft Windows, MacOS is the second most widely used desktop OS. In the earlier years, Mac OS

had a negligible number of types of spyware and malware which have affected the Windows users. The share of usage of MacOS is smaller compared to Windows. Apple regularly releases security updates for MacOS. The latest version of this is MacOS 10.12 Sierra.

Architecture

Functionally, the Mac OS X architecture has several layers. UNIX core is the operating system's base layer. The layers are as follows:

- Graphics and Media Layer Includes Coral Image, OpenGL, Core Audio, Core Video and QuickTime.
- Application Framework Layer Includes Cocoa, Carbon and Java
- Top Layer Also known as Aqua, it offers the user a working interface

The following figure shows the architecture of Mac OS:

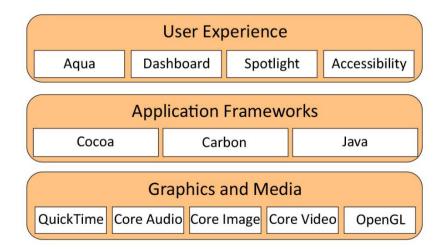
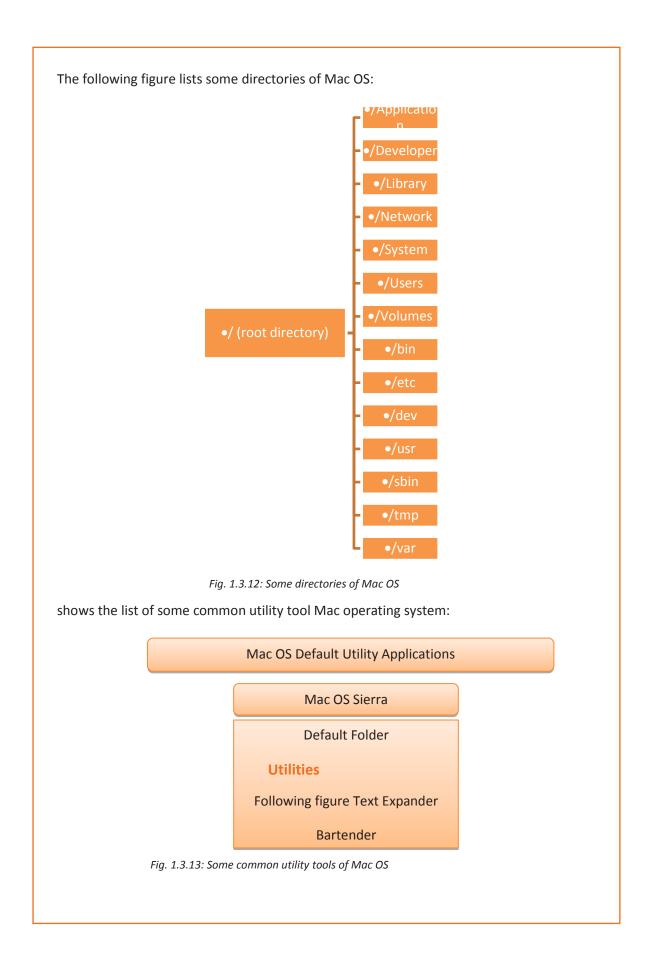


Fig. 1.3.11: Architecture of Mac OS

Directory Structure

The Mac OS X file system also stores the files within folders known as directories. The topmost folder is root directory. Folders located within the root are called subdirectories.

The root directory is referred to as /. Within the root, by default, there are several additional folders that include Application that stores programs and Users that stores the home folder information for each user account.



Configuration/Installation

One can install MacOS over any earlier version, without removing the data. The following figure lists the steps to reinstall the Mac OS:

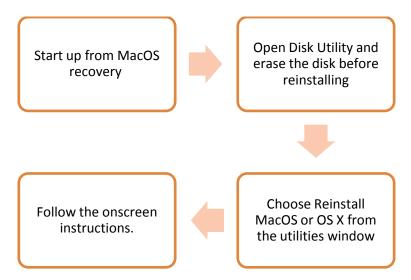


Fig. 1.3.14: Steps to install Mac operating system

Linux

Linux is a Unix-like OS that is assembled under free and open-source software development and distribution model. The defining component of Linux is the Linux kernel.

The user interface (shell) may be a command-line interface (CLI) or a GUI. For any desktop system, the default mode is usually GUI. Command-line interface can also be availed through virtual console or through a terminal emulator Windows.

Architecture

Linux OS has three components:

- Kernel is the core of Linux OS. It is responsible for the major activities of OS. It
 interacts with the underlying hardware components directly with the help of various
 modules in it. It hides low level hardware details providing required abstraction to
 system.
- System libraries are special programs which are used by the system utilities and application programs to access Kernel features.
- System utility programs are accountable for performing individual and specialized level tasks.

The following figure shows the architecture of Linux OS:

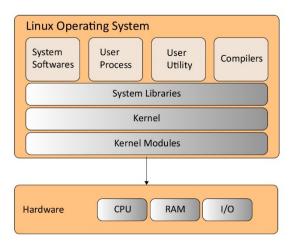


Fig. 1.3.15: Architecture of Linux OS

Directory Structure

The following figure lists the directories of Linux OS:

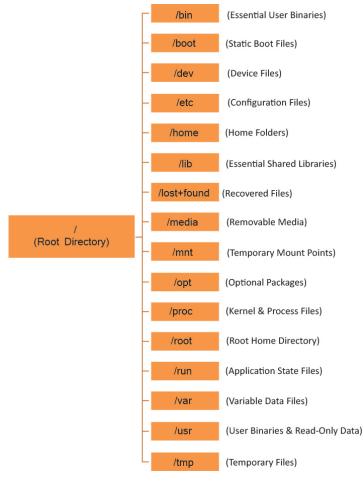


Fig. 1.3.16: Directories of Linux OS

Utilities

The following figure lists some of the common utility tools of Linux operating system:

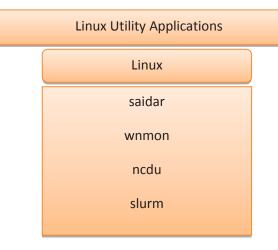


Fig. 1.3.17: Some common utility tools of Linux operating system

Configuration/Installation

Package managers are used to install, update or remove a software in Linux. Some package managers are:

- Synaptic Package Manager
- PackageKit
- Yum Extender

Most of the major Linux distributions contain extensive repositories. But not all the software that can run on Linux are available from those official repositories. A user can:

- download the pre-compiled packages from websites directly
- install the packages from unofficial repositories or
- compile the source code by themselves.

1.3.4 Other Software

System software includes OS software and utility software. A service engineer should know about the utility software that are compatible to the OS platform. The service engineer must be able to search for the utility software that are correct for the user and install them in the system. He/she should know the use of software such as:

- Commercial use software like AutoCAD,
- Mail server software like MS Exchange,
- Remote access software like TeamViewer
- Antivirus software like AVG, Kaspersky and so on.

The following figure lists the general steps of installing a software: Download software Run the downloaded from Internet or Agree to the licence .exe file or purchase a software agreement Run the CD CD Keep on doing the Insert the activation Click on Finish after steps, following the key of the software instructions on the completing installation when asked installation screen

Fig. 1.3.18: General steps for installing a software

MS Exchange

Microsoft Exchange Server is used as a mail and calendaring server. It runs on Windows Server OS. It is useful to optimize the organization of mail, contacts and calendars in an environment with a large user base. Microsoft Exchange is used in universities and large companies. The following image shows a snapshot of MS Exchange server:

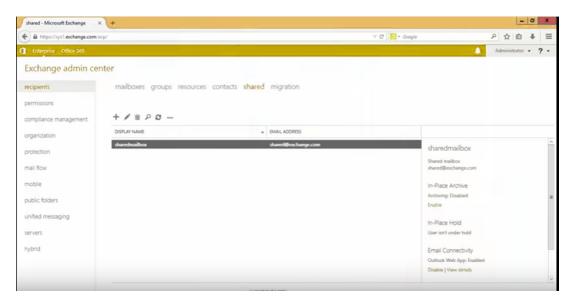


Fig. 1.3.19: A snapshot of MS Exchange server

An MS Exchange Server requires Client Access Licensing (CALs) which are not same as Windows CALs. Exchange Server CALs are also included in corporate license agreements like Core client access licences and Enterprise Agreement (EA). The service engineer must be aware of the requirements for installing the software.

Auto CAD

AutoCAD is a software application which has a comprehensive set of computer-aided design(CAD) and drafting tools, used for commercial purposes. Its features equip a designer with increased graphic abilities such as modifying any design with ease, performing animations, making design calculations, visualizing ideas and making proper use of aesthetic tools such as colours and fonts. The following image shows a snapshot of AutoCAD:

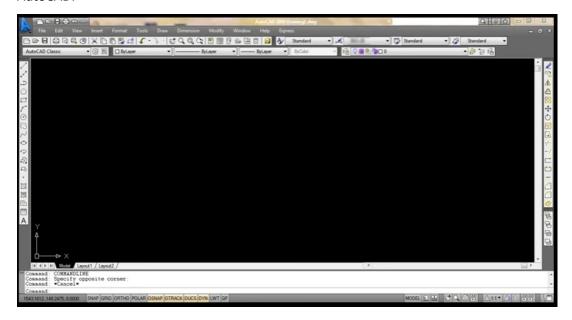


Fig. 1.3.20: A snapshot of Auto CAD software

The service engineer should be aware of the compatibility of this kind of software to other software and the latest versions of the software.

Remote Access Software

Remote desktop software, also known as remote access software or remote control software, allows a user to control one computer remotely from another.

Accessing a computer remotely requires a software to be installed on the computer which is to be connected (known as host). Another computer or device (client) having right credentials can connect to the host and control it.

- **TeamViewer**: It is a computer software package for:
 - o desktop sharing
 - o remote control
 - o web conferencing
 - o online meetings
 - o file transfer between computers.

By using TeamViewer one can reboot a PC in Safe Mode remotely and then reconnect with that automatically.

TeamViewer Connection Extras Help 🛂 Remote Control | A Meeting Free license (non-commercial use only) Allow Remote Control Control Remote Computer Please tell your partner the following ID and Please enter your partner's ID in order to control password if you would like to allow remote the remote computer. control. Partner ID ~ Remote control File transfer Use your personal password to access this computer from anywhere. Connect to partner ********

The following image shows a screen of TeamViewer:

Fig. 1.3.21: A screen of TeamViewer

Remote Utilities: It is a software designed for Windows to provide remote access
from a computer to another one via a local area network or over the Internet. It
utilizes a Client-server model consisting of a Host installed on the remote computer
and a Viewer installed on the local computer. The user requires the internet protocol
(IP) address of the remote computer and the access password to access it. The
following image shows a screen of Remote Utilities:

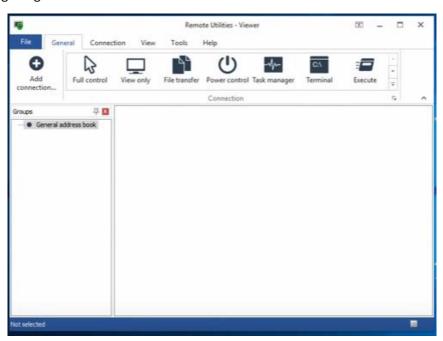


Fig. 1.3.22: A screen of Remote Utilities

• Windows Remote Desktop: It is a built in remote access software for Windows OS. This program requires no additional download for being used. The following image shows a screen of Windows Remote Desktop connection:

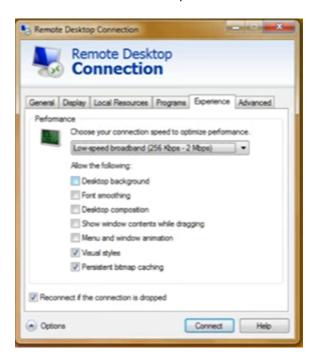


Fig. 1.3.23: A screen of Windows Remote Desktop connection

• **Chrome Remote Desktop:** It is an extension for the Google Chrome. It allows the user to setup a system to be accessed from any other Chrome browser. The following image shows a screen of Chrome Remote Desktop connection:

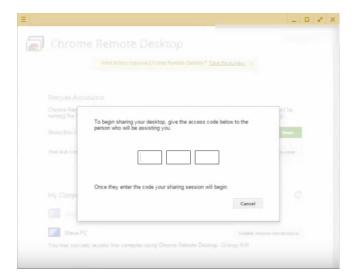
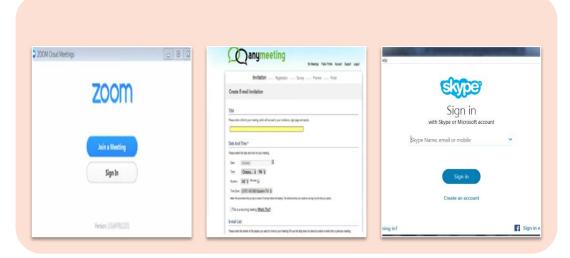


Fig. 1.3.24: A screen of Chrome Remote Desktop connection

Online Service Software

The following figure shows some examples of online service software:



Offers both cloud meetings and webinar facilities.

Known for video conferencing, which is referred as Zoom by the users.

Combines online meetings, video conferencing and mobile collaboration on a single platform.

A web-based application accessible by the users using a web browser.

Enables the users to host meetings and web based conferences and attend conferences and meetings.

Lets the user share their desktop screen with remote users over the web. Offers audio and video call services.

Users can exchange digital documents such as images, text and video.

Allows video conference calls.

Fig. 1.3.25: Some online service software

Antivirus Software

Antivirus is also known as anti-malware software. It is a set of programs that are used to prevent, detect and remove software virus, worms, adware, Trojans and so on. These software need to be up-to-date as a system without antivirus can be infected within a few minutes of being connected to the Internet.



- **Virus:** replicates itself by copying its own source code. It also infects other computer programs by altering them.
- Worm: replicates itself for spreading to other computers through web. It does not modify files but it resides in memory and continues duplicating itself.
- Adware: displays or downloads the advertising material (banners or pop-ups) automatically when the user is active on Internet.
- **Trojan:** It is disguised as legitimate software. It can be used by hackers who are trying to gain access to the user's systems.

The following figure lists some examples of antivirus software:



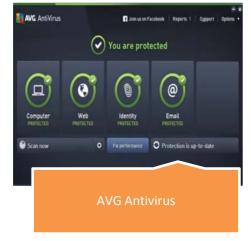






Fig. 1.3.26: Some examples of antivirus software

Activity 🙀



Match the following.

- Shell
- BIOS
- 3. Unix
- Kernel
- 5. Sierra

- a. OS core
- b. MacOS
- c. User Interface
- d. Multitasking OS
- e. ROM

Activity



Choose the correct answer for the following questions.

1. Which of the following program loads the OS when the system is turned on?

a. Boot Loader

b. Device Driver

c. Application

2. Which of the following OS is a real-time OS?

a. RTLinux

b. Linux

c. Windows XP

3. Root directory is often referred to as:

a. /

b. %

c. #

4. Which of the following software is used for remote access?

a. Skype

b. Teamviewer

c. AVG

UNIT 1.4: Basics of Networking

Unit Objectives



At the end of this unit, you will be able to:

- 1. Define network and its topologies
- 2. List the types of network
- 3. Describe the layout of networks and their advantages
- 4. Recognize network devices
- 5. Explain TCP/IP and IP addressing
- 6. Identify cables and connectors

1.4.1 Network

A computer network is a group of computers and other devices such as printers, scanners, copiers and fax machines, connected together with the help of transmission media and various communication devices. All electronic devices such as a computer or a printer attached to a computer network for data transmission or communication are called nodes. The transmission path between two nodes is called a link. The set of rules followed for data transmission over a network is called a protocol. These set of rules define how the data will be transmitted between the connected nodes.

A basic diagram of a network is shown in the following figure:

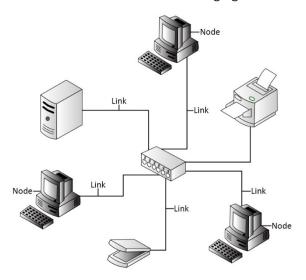


Fig. 1.4.1: Basic diagram of a network

Alternatively, a computer network helps the end-user computers to share common resources, as shown in the following figure:

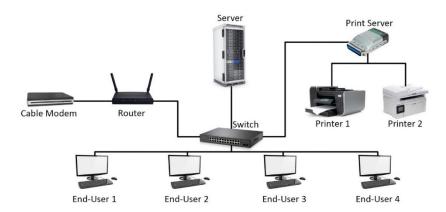


Fig. 1.4.2: Computers accessing shared resources over network

In the preceding figure, the main server is connected to the end-user computers through a switch. The switch is connected to the router, which is connected to the Internet via a modem. The switch is also connected to a print server acting as a medium between the end-user computer and the print server. The print server connects the two printers to the computers in the network.

1.4.2 Advantages of a Computer Network

The following figure lists the various advantages of a computer network:



Fig. 1.4.3: Advantages of a computer network



1.4.3 Network Architecture

Network architecture is a structural model that specifies the type, layout and components of a network along with data format, different protocols and services provided. The following figure shows the different network architecture:

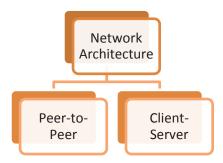


Fig. 1.4.4: Different network architecture

Peer-to-Peer Network Architecture

It is a network architecture where all the computers connected to the network have similar capabilities to use the resources that are available on the network. There is no central server in this architecture and each workstation on the network shares its files equally with the others. Peer-to-peer networks are usually simple, but do not provide the same performance in case of heavy network loads. The following figure shows a peer to peer network architecture:

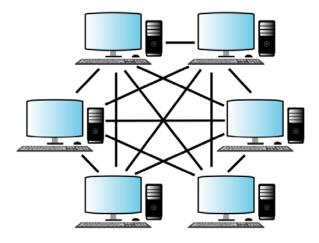


Fig. 1.4.5: Peer to peer network architecture

Client-Server Network Architecture

In client-server architecture, the computers on the network are either clients or a server. The following figure shows a client-server network architecture:

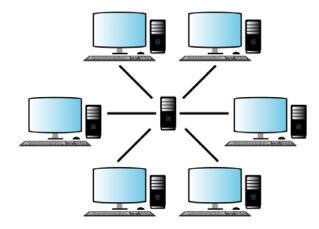


Fig. 1.4.6: Client server network architecture

Server

A computer which holds programs, network operating systems and the shared files is called a server. These are computers devoted to management of printers (printer servers), network traffic (network servers) and disk drives (file servers) are known as servers. They provide access to the network resources to all the devices which are using the network. There are different kinds of servers such as file servers, communication servers, fax servers, database servers, print servers, mail servers and so on.

The following figure lists some of the servers along with their description:

File Server

- •It provides data such as data files, e-mail and printer access programs which are shared among various clients in the network.
- •It has large hard disks which all users in the network share.
- Application softwares and shared data reside on this server.

Print Server

•It acts as a buffer for the print jobs sent by the users to the shared printers or centralised printers.

Communication Server

•It grants the outside users access to the network through a telephone line.

Mail Server

•It provides electronic mails (e-mails) to users of the network.

Fig. 1.4.7: Different types of servers

Clients

Client computers access the network and use various shared resources in the network. They depend on servers for various resources, such as files, access to devices, and even processing power. They receive services from the servers as per their request.



1.4.4 Types of Network

There are mainly three types of network classified according to the area covered for transmission, as shown in the following figure:

Local Area Network (LAN)

Metropolitan Area Network (MAN) Wide Area Network (WAN)

Fig. 1.4.8: Types of network

LAN

The network that is distributed over a small area, such as within a building, school, or home is called LAN. It allows numerous users to share common resources. Generally, a LAN is limited to 255 users per LAN. The following figure shows a LAN network:

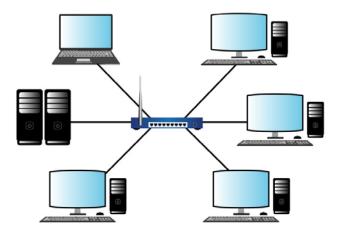


Fig. 1.4.9: LAN network

LANs generally employ Ethernet cables for connecting various devices within the network. It can connect to mainframe or the minicomputers through network devices such as routers or bridges.



Ethernet is a network protocol which defines a standard way to connect computers on a network over a wired connection (LAN).

MAN

MAN is a network that interconnects the nodes or computers with resources within a geographical area/region that is greater than the area covered by a LAN but smaller than that of a WAN. The following figure shows a MAN network:

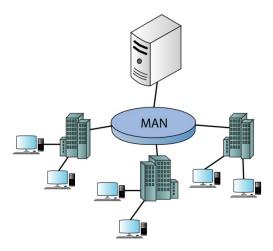


Fig. 1.4.10: MAN network

A MAN typically includes one or more LAN but covers a smaller geographic area than a WAN. It can also be defined as the interconnection of a number of LANs bridged with backbone lines. Such a usage of MAN is also known as a campus network.

WAN

WAN is used to connect devices over much larger distances than LANs. A WAN is established by connecting LANs using routers. WAN is not limited to a single person or organization, for example, Internet, which is a network of networks spread across the globe for exchange of information and services. The following figure shows a WAN network:

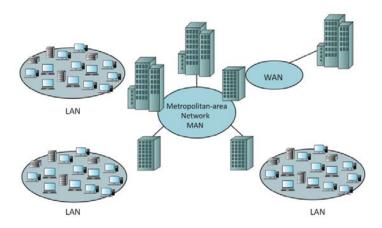


Fig. 1.4.11: WAN network

1.4.5 Network Communication Technology

Network communication technology deals with the technology aspects of networking communication. Communication is the process of sharing information and ideas through speech, symbols, signals, or signs. Sharing of data and resources among different computers in a network needs a transmission system, communication protocols and technology. Communication network can be wired or wireless. Computers transmit and receive information across the communication links. The elements that are required for network communication are:

 Network Interface Card: Each computer requires a special card, called network interface card (NIC) to be connected to a network. The NIC prepares data to be sent, receives data and also controls the data flow between computer and network.



Fig. 1.4.12: Network interface card

- Data communication software: It enables the computers to communicate with each other. It tells the computers how to exchange information with other computers.
 - Protocol: The data transmission protocols perform the following functions:
 - o Data Sequencing: breaking up of a long message into smaller packets
 - o Data Routing: finding out the best route for sending the packet to destination
 - Flow Control: regulates the speed of transmitting data between fast sender and slow receiver
 - Error Control: detecting error and recovering the data

Various types of network communication technologies are as follows:

- Internet is a wide range of computer network with unlimited number of users. It contains a large number of intranets.
- Intranet is a network of computers that is designed for a group of users. It serves as a
 private Internet for an organization. The authorized users or the employees of an
 organization can access intranet from Internet but the number of users is less. For
 example, intranet is used in an organization to share information with its employees
 only.

Extranet refers to an intranet which can be accessed by authorized users outside the
intranet but partially. It enables business to share information in a secure way over
the Internet. For example, when an organization wants to exchange some information
with another organization such as their customers or vendors, it may provide access
to its intranet to the employees of the other organization.

The following figure shows the intranet, extranet and the Internet:

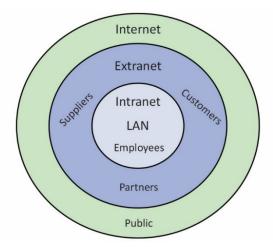


Fig 1.4.13: Intranet, Extranet and Internet

Mode of Transmission

Communication technology also deals with the mode of transmission of data. Mode refers to the direction of data flow over the network. There are three types of modes:

 Simplex: Communication is unidirectional. Data can be sent in one direction only, from the sender to the receiver.



Fig. 1.4.14: Simplex mode

• Half Duplex: Data can be sent in both direction but not at the same time.



Fig. 1.4.15: Half duplex mode

 Duplex: Data can be sent in both directions simultaneously. A device can send as well as receive data. Example: Telephone network



Fig 1.4.16: Duplex mode

1.4.6 Network Operating System (NOS)

An operating system dedicated to networking which:

- Allows access to shared file and printer access among the computers on the network
- Enables sharing of data, applications, security, and other networking functions

The common functionalities of NOS are as shown in the following figure:

User administration and management

System maintenance activities like backup and updating softwares

File management

Monitoring network resources

Managing and prioritizing the print jobs in the network

Internet working capabilities such as routing

Fig. 1.4.17: Functionalities of NOS

Based on its architecture, there are two approaches to network operating system:

 NOS based on a peer-to-peer architecture: Users can share resources and access files from each other. This system does not have a file server or centralized management resource. For example, AppleShare is used for connecting Apple products. The following figure lists the advantages and disadvantages of peer-to-peer NOS:

Advantages

- Easy setup
- •Less hardware needed

Disadvantages

- No central server for storage
- •Less security provided

Fig. 1.4.18: Advantages and disadvantages of peer-to-peer NOS

Network operating systems based on client—server architecture: It allows the
networks to centralize the applications and various functions in one or more
dedicated servers. The server allows access to resources and maintains security. This
system allows multiple users to share the same resources simultaneously regardless
of their physical location. For example, Novell NetWare

The following figure lists the advantages and disadvantages of client-server NOS:

Advantages

- •It has greater stability
- Security is maintained by the server
- New hardware and technology can easily be integrated into the system
- Hardware and operating system may be specialized
- •Servers can be accessed remotely from different locations

Disadvantages

- Higher cost
- •Dependent on a central server for any operation
- Regular maintenance required

Fig. 1.4.19: Advantages and disadvantages of client-server NOS

1.4.7 Network Devices

Network devices are components which are used to connect computers and other electronic devices in order to share resources such as printers, fax machines, database and so on. The functions of network devices, working together, are as follows:

Controlling traffic: Network devices filter and isolate the data traffic.

- Connectivity: Using various network protocols, network devices connect different types of networks.
- Hierarchical addressing: These devices segment the network and deliver data to the right destination using destination address.

The following table lists various network devices used in networking:

Device	Image	Description
Modem	Fig. 1001 115. 100 100 100 100 100 100 100 100 100 10	Modem converts the digital signal into analog signals (modulates) for transmission and converts analog signals to digital signals (demodulates) for transmitted information over a network.
Router		A router reads the destination network address also called the IP address on a data packet and forwards it to the appropriate network.
Gateway		Gateway acts as an interface between dissimilar networks with different protocols translating one data format to another.
Firewall		Firewalls enable network security as it monitors incoming and outgoing network traffic facilitating controlled data access between the networks.

Hub		A hub is used to connect the devices on an Ethernet network using twisted pair cable to provide signal regeneration.
Bridge	2 2 2 2 2 2 2	A bridge joins two or more similar networks to make a bigger network for communication or transmission of data.
Repeater		A repeater regenerates the network signals so that they can travel longer distances on the network.
Transceiver		Transceiver can function both as a transmitter and a receiver of signals.
Switch	THE RESIDENCE OF THE PARTY OF T	A switch connects the devices on a network with twisted-pair cable for forwarding data to its destination using physical address.

Wireless access point(WAP)		WAP is used to create a link between wired and wireless segment of the network.
Channel Service Unit/Data Service Unit (CSU/DSU)	NETHORK IN OUT NOW DWAN CHANGET VSS NOS664	CSU/DSU helps to translate the digital signals used in a LAN to signals used in WAN.
Integrated Services Digital Network (ISDN) terminal adaptor		It connects the devices to the ISDN lines. These adapters are required to reformat the data from transmitter or a computer node for being transmitted on ISDN links.

Fig. 1.4.20: Network device

1.4.8 Network Topologies

Network topology refers to the arrangement of the different elements (links and nodes) of a network. It is the layout of a network and may be depicted as:

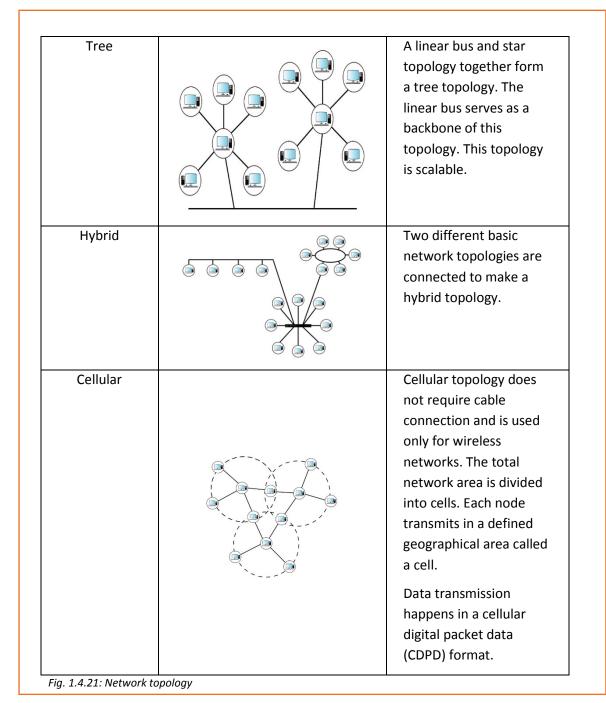
- Physical topology: It is the arrangement of the various network components.
- Logical topology: It describes how data flows in a network.

Distances between the nodes, physical connections, rate of transmission, or types of signal may differ between two networks, but still topologies may be identical.



The following table lists the eight basic network topologies:

Topology	Image	Description
Point to point		A simple topology having a dedicated link between two nodes in a network.
Bus		A single cable connects every node, using interface connectors. The central cable, known as bus, is the backbone of the network.
Line		Multiple nodes are connected in succession to each other. The end node terminates the line.
Mesh		All the nodes in the network are interconnected. Each node relays data or message for other nodes in the mesh topology.
Star		The central node connects each node indirectly through hub, router or switch.
Ring		The nodes in the network make a closed loop. Data travels in one direction around the ring. Data is passed through the nodes from sender to the receiver.



1.4.9 TCP/IP and IP Addressing

The TCP/IP is the communication protocol for Internet. It is a protocol suite which has two protocols:

- Transmission Control Protocol
 - o Assembles the message to be transmitted over network into smaller data packets
 - o Reassembles the received packets into original message
- Internet Protocol

 manages the address of each data packet so that the data packet reaches the right destination. This is known as IP addressing.

It is also known as Internet Protocol Suite. TCP/IP is based on client/server model of communication. The client computer requests the server such as opening a web page. The server provides service such as connecting to the web page and letting the access of that web page. Each client request in TCP/IP is an independent request, not related to the previous one. Hence it does not require a dedicated connection.

Application protocols that use TCP/IP include:

- Hypertext Transfer Protocol (HTTP) allows data communication over world wide web (WWW).
- File Transfer Protocol (FTP) facilitates transferring of files over network
- Telnet (Telnet) enables log on to remote computers
- Simple Mail Transfer Protocol (SMTP) enables mail exchange
- Serial Line Internet Protocol (SLIP) and Point-to-Point protocol (PPP) are used for personal computers to connect to Internet using phone lines

TCP/IP Model

TCP/IP model or the Transmission Control Protocol/Internet Protocol model is the set of protocols which defines how two or more computers can communicate with each other on Internet. There are many protocols working within TCP/IP model. These protocols provide various functionalities which are important for the data transmission over the networks. TCP/IP is composed of five layers, as shown in the following figure:

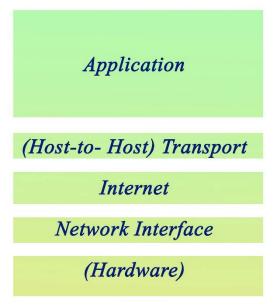


Fig. 1.4.22: Layers of TCP/IP network

 responsible for the placing or receiving of TCP/IP Network Interface Layer/ packets on or off the network medium. includes Ethernet and Token Ring and WAN **Network Access Layer** technologies. Internet Layer responsible for IP addressing and routing functions manages rate of data flow Transport Layer manages reliability of data provides the applications with access to services **Application Layer** defines the protocols that the applications will use for exchanging data

Fig. 1.4.23: Description of TCP/IP layers



Data in network layer having network header are called packets.

IP addressing

An IP address is a unique identifier for a computer or any other device attached to the network. It is a 32-bit value. IP addresses are written in four decimal numbers which are separated by dots. Each section ranges from 0 to 255. For example, 172.16.254.2 is IP address of a node. When the address is converted to binary, each section contains 8-bit which is called an octet.



A binary number is a series or combination of 1s and 0s.z

The following figure depicts the dotted decimal notation of the given IP address:

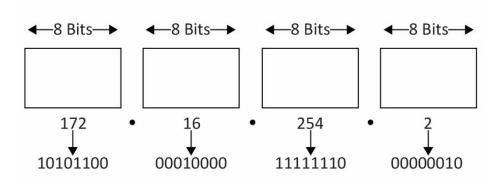


Fig. 1.4.24: Example of an IP address

IP addresses are also known as host addresses.

In a TCP/IP network the routers pass data packets between networks without knowing exact location of the destined host. Routers only know the network of the host. Routers deliver packet to the network and then using the information stored in the router, the packet is delivered to the host. For this, IP address contains two parts:

- First part is network address
- Second part is host address.

In order to locate devices in a distributed environment, which is different networks connected to each other, nodes are assigned explicit addresses which identify the network in which the device is on, and also identify the device in that particular network. When these two unique identifiers are combined, it is a globally unique address.

Example

IP Address: 192.168.13.123

Network Address: 192.168.13.0

Host Address: 0.0.0.123



Host numbers 0 and 255 are reserved IP addresses. An IP address with all host bits set to 1(Decimal 255) is a broadcast address. An IP address with all host bits set to 0 (Decimal 0) identifies the network itself.

Steps for Identifying the IP Address of a Node

To identify the IP address of a node or a computer on a network, perform the following steps:

- Step 1: Open Command Prompt from Start Menu.
- **Step 2:** Type ipconfig, and press Enter as shown in the following figure:

Fig. 1.4.25: Steps of knowing an IP address

Step 3: Type Exit to close the screen.

Ping a Computer

To ensure the computer or the node is on the network and can receive messages, use Ping command.

To ping a computer on the network, perform the following steps:

- 1. Open Command Prompt from Start Menu.
- 2. Type the IP address of the computer to be pinged on the Command Prompt (for example, 10.2.100.130)
- 3. Press Enter. The following figure shows response of ping command

Fig. 1.4.26: Pinging a computer

1.4.10 Cables and Connectors

Different cables are used for establishing a physical communication link. Cables are connected to the devices through different connectors.

Cables

Cable form the transmission media for a network. Transmission media or channels, also known as links, lines or path, are used to interconnect the nodes in a network. Transmission channels are of different types of communication wires and cables such as twisted-pair cable, coaxial cable and optical fibre cable.

The following table lists different types of cables used in networking:

Type of Cable	Image	Description
Twisted pair		Have two conductors that are twisted together to cancel out the electromagnetic interference that may come from external sources. This type of cable is almost the same as a paired cable. The difference is in the two twined inner wires which are insulated unlike the paired cable. Used for transmission of data over networks such as, LAN.
Coaxial/Heliax cable	The second secon	Has a thin conducting wire inside a tubular conducting shield, which is protected by a tubular insulating jacket. Used to connect video equipment and carry television signals.

Cross over cable		Connects computing devices, often of the same type such as two switches.
Optical fibre cable	Core Cladding Coating Buffer	Contains one or more optical fibres for carrying light. The optical fibres are coated with plastic layers and secured in a protective tube. Used for long distance communication.
Optical fibre cable (Single Mode)	25117	Has small sized dimetral core and permits a single mode of light to propagate through it. As a result, it reduces the number of light reflections when the light passes through the centre. This decreases the attenuation and enables the signal to travel further. Used for a long-distance coverage with a very high bandwidth requirement.

Optical fibre cable (Multi Mode)



Has big dimetral core and permits several modes of light to propagate through it. The number of light reflections formed when the light passes through the centre are more. This enables larger quantity of data to pass through at a given time. The strength of the signal decreases over long distances because of the increased dispersion and attenuation.

Used for backbone applications in buildings because of the reliability and high capacity.

Fig. 1.4.27: Cable types

Connectors

There are various connectors used for connecting cables in networking as shown in the following figure:



CAT 5E Ethernet RJ 45 Connector



CAT 6 Ethernet RJ 45 Connector



CAT 6A Ethernet RJ 45 Connector



Telephone Network Connector



Coaxial Connector



Wire Connector and Terminal

Fig 1.4.28:-Connectors

Crimping

Crimping means joining of two pieces of metal, generally a wire and a connector, together by deforming one of them and enabling one to hold the other. The resultant deformity is known as a crimp. The following image shows the various steps involved in crimping:

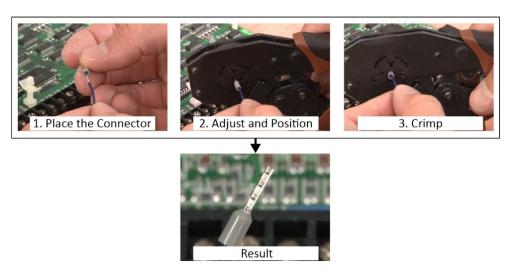


Fig. 1.4.29: Crimping



- In case of crimping, pliers should not be used as the deformity cannot be formed properly.
- If there is air in between the crimp and the connector, it collects moisture. This eventually causes corrosion in the wire and can lead to a connection failure.

Steps for Crimping RJ45 Cable

For crimping RJ45 cable a colour code of the internal wires is to be followed.

• To make a straight cable, the colour code is listed in the following figure:



Fig. 1.4.30: Color code for crimping RJ45 straight cable

• To make a crossover cable, the colour code is listed in the following figure:



Fig. 1.4.31: Color code for crimping RJ45 crossover cable

The steps for crimping RJ45 cable are as follows:

Step 1: Strip 2 inches of the outer cover from the cable end with a utility knife as shown in the following figure:



Fig. 1.4.32: Stripping the cable

Step 2: Pull the twisted pairs of wires backward and cut the core as represented in the following figure:





1. Pull wires backward

2. Cut the core

Fig. 1.4.33: Cutting the core

Step 3: Make the twisted wires straight using tweezers and keep them arranged in a row as shown in the following figure:





1. Straighten the twisted pairs

airs 2. Arrange the wires in a row

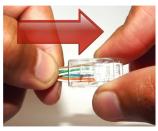
Fig. 1.4.34: Straightening and arranging the wires

Step 4: Place the untwisted wires in a position from right to left according to the color code of the wires and then trim the wires up to a suitable length as shown in the following figure.



Fig. 1.4.35: Trimming of wires

Step 5: The wires are to be inserted into RJ-45 connector. RJ45 connector must be crimped to the cable using a crimping tool. by compressing the jacket as well as the cable into the connector in such a way that the wedge at the base of the connector is pushed into the jacket as shown in the following figure:







1. Insert into connector

2. Crimp

3. Result

Fig. 1.4.36: Crimping the connector



At the time of inserting the wires into the connector, it is to be made sure that the colour goes into the channel appropriate for that.

1.4.11 Wireless Network

A wireless network uses wireless connections between two network nodes. Wireless networking helps to avoid the costly process of setting up cable connections in a building. Examples of wireless network are WLAN, Bluetooth, cellular network and so on.

Wireless Local Area Network (WLAN)

A WLAN is used to connect two or more devices which are present over a short distance. WLAN is set up using a wireless distribution method. It provides a connection for Internet access through an access point. It is used in cities or towns to connect networks in two or more buildings without installing a wired link.

The following figure shows a WLAN:



Fig. 1.4.37: WLAN

Cellular Network

A cellular or mobile network is a network that is served by fixed-location transceiver. The fixed location is known as base station. This network is distributed over land areas which are known as cells. To avoid any disturbance, each neighboring cell uses a different frequency. When the cells are joined, these provide network coverage over wide geographic area. This enables a number of portable devices to connect with each other in any network through base station. The following figure shows a cellular network:

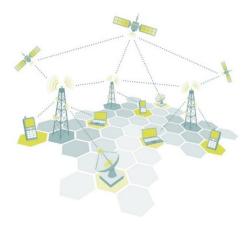


Fig. 1.4.38: Cellular technology

Bluetooth

Bluetooth provides a wireless technology standard to exchange data from any fixed or mobile device over a short distance and thus build a personal area network (PAN). The following figure shows a bluetooth headset:



Fig. 1.4.39: Bluetooth

Activity



Find out the network address and host address for the given IP addresses.

IP Address Network Address Host Address

10.10.48.80

28.212.250.254

10.10.250.1

Activity

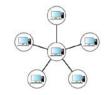


Match the following.

1. Switch

A.

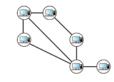
2. Mesh B.



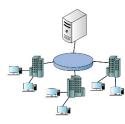
3. Star C.



4. MAN D.



5. WAP E.



UNIT 1.5: Internet and Web Browser

Unit Objectives



At the end of this unit, you will be able to:

- 1. Describe Internet
- 2. Recognize the common methods for Internet access
- 3. Explain web browser and its types
- 4. Define cyber security and its importance
- 5. List IT acts and cyber laws

1.5.1 Internet

Internet is a network that is available globally. Billions of computers and various electronic devices interconnected together, establish the global system of network. It is possible to communicate with anyone anywhere in the world and get access to any information. The following image shows Internet connectivity around the world:



Fig. 1.5.1: Internet connectivity around the world

Internet can also be described as the wired or wireless communication network with the help of which one can transmit and receive information for single or multiple operations. By using Internet one can browse different websites, download files, pictures and videos, upload files, listen to music, connect with people and do lots of other things.



- **Browse:** Browse means to look for information as well as to access and view content on the Web using an interface known as a Web browser.
- Web: World Wide Web (WWW), also called Web, is a group of different websites which can be accessed using the Internet.
- **Website:** A website is a collection of related text, images, and resources.
- **Download:** Download a file refers to requesting to get the file from another system or webpage and to receive that. The requested file is transferred to local storage.
- **Upload:** Upload a file refers to sending data to a remote system (server or any client)

Working of Internet

Various devices can be connected to a network with the help of physical cables or via wireless connection such as Wi-Fi and 3G/4G. The following image shows how two computers are connected to the Internet:

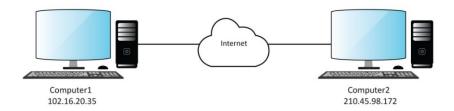


Fig. 1.5.2: Two computers connected through Internet

One computer having IP address 102.16.20.35 is connected to the other computer having IP address 210.45.98.172 via Internet. Internet here can be represented as an abstract object between the two computers. Generally, a cloud symbol is used for depicting Internet.

The following figure shows the working of Internet:

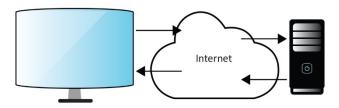


Fig. 1.5.3: Working of Internet

When a website is visited by the user, the browser sends a request to the server over internet. A web server is a computer program which listens to the requests from browsers and executes them. The server after getting the request, locates the required document and returns that to the browser.



Data, over the Web, is exchanged as packets. A packet is a small chunk of data.

Advantages of Using Internet

Internet helps in variety of tasks, be it finding information, communicating with people around the globe, dealing with funds, shopping from home, tuning into music, watching recordings and much more.

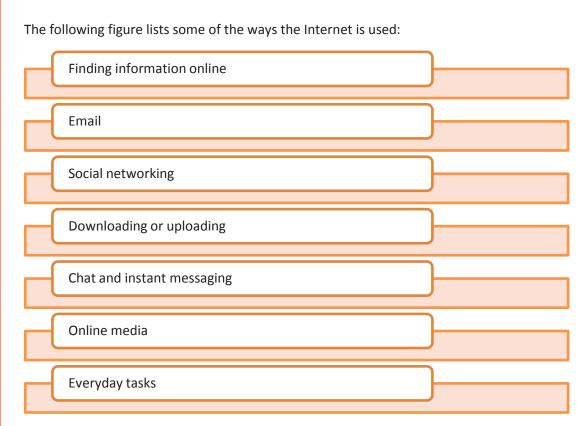


Fig. 1.5.4: Common uses of Internet

Finding Information Online

As there are a large number of websites available online today, that provide a lot of information on the Internet. With the help of the search engines it is easy to find information. Typing one or a few keywords within the string "", directs a search engine to look for relevant websites to download any software or any other trouble shooting.

Email

Email enables sending and receiving messages over the Internet. To use the Email, the user needs to have own email account, usually called an email address. The following figures show an interface of popular Emails or webmail service:

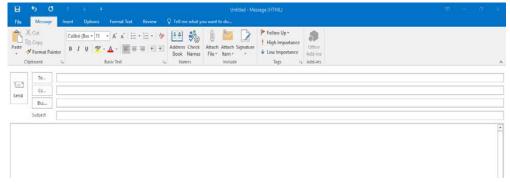


Fig. 1.5.5: Outlook Window

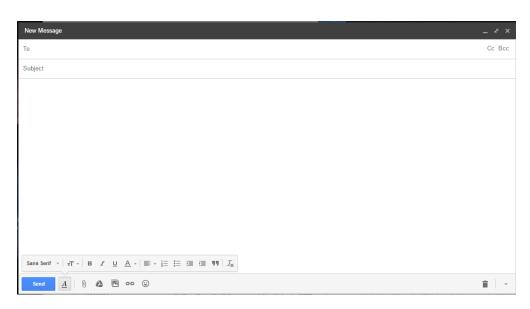


Fig. 1.5.6: Gmail Window

The following figure explains the fields of an Email:

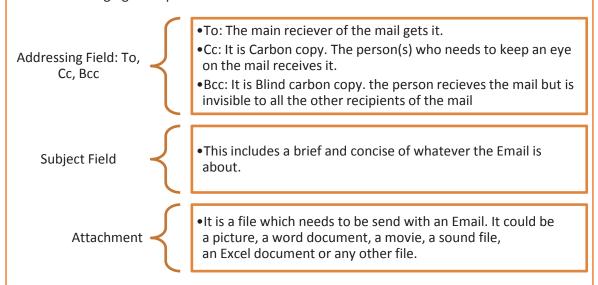


Fig. 1.5.7: Fields of an Email

Uploading and Downloading on Internet

When data is sent from a computer to the Internet, it is known as uploading. The reverse, that is receiving data from the Internet is known as downloading. A user can upload files, documents, images and can download files, documents, software, songs and so on.

The user can drag the files which are to be uploaded on the upload window or he/she can browse to search and select the file from his/her computer.

The following image shows an upload window:

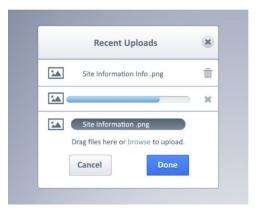


Fig. 1.5.8: Upload window

The following figure lists the steps involved in downloading and installing a software:

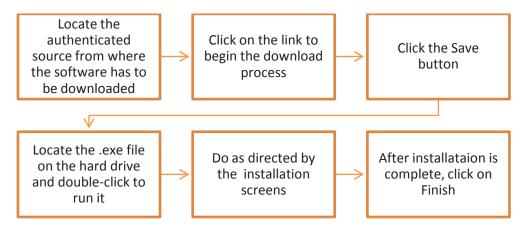


Fig. 1.5.9: Steps for downloading and installing a software

The user can also open and run the software from the downloading window directly as there is an option to run when the software downloading process is complete.



- One should be very careful while downloading any software or any tool as many download sites can have software that is of malicious intent.
- When installation process is going on it is recommended to close all the programs except the Windows Explorer.

1.5.2 Internet Access

Internet access enables an individual or any organisation to be active on Internet using computers or other mobile devices. When a device is connected to Internet, users of the device can access the Internet services.

Internet Service Provider (ISP)

An ISP is a company that provides individuals and companies access to Internet.

If an individual connects to the Internet via an ISP, he/she has a temporary IP address assigned across the span of dial-in session. A user computer connecting to Internet through LAN, can have a permanent IP address.

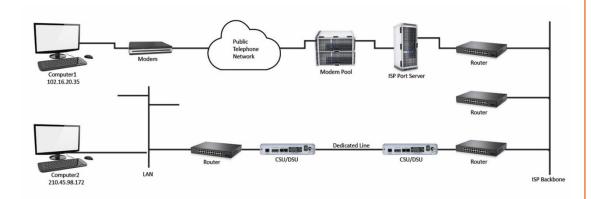


Fig. 1.5.10: Internet Service Provider

The ISP manages a pool of modems for the dial-in customers with the help of a dedicated computer that controls the data flow between the modem pool and a dedicated line router. This setup is known as a port server because it serves access to the network. Internet usage and billing information of any user is collected here.

After the packets go through the phone network and ISP, those are routed to ISP backbone. From there the packets traverse several routers, dedicated lines, and several networks until they find the destination.

The following table lists the top ISPs in India as on 31 March 2016:

Rank	ISP	Narrowband	Broadband	Total
1	Airtel	52,064,601	38,473,189	90,537,790
2	Vodafone	39,792,668	27,760,081	67,552,749
3	Idea Cellular	21,110,847	22,924,981	44,035,828
4	Reliance Communications	23,449,233	15,567,769	39,017,002
5	BSNL	13,740,051	20,351,570	34,091,621
6	Aircel	14,906,282	7,541,005	22,447,287
7	Tata Teleservices	11,812,117	9,229,125	21,041,242
8	Telenor India	13,671,479	0	13,671,479
9	MTNL	456,096	1,511,496	1,967,592
10	Videocon	1,213,631	0	1,213,631
11	Atria Convergence Technologies	0	941,006	941,006

Fig. 1.5.11: ISP list

Source: https://en.wikipedia.org/wiki/List_of_internet_service_providers_in_India

Internet Infrastructure and Routing Hierarchy

The backbone of Internet is combination of a number of large interconnected networks known as Network Service Providers (NSPs). All these networks are linked to each other to exchange the influx of data. Each NSP is connected to Network Access Points (NAPs). An NAP is a point where packet traffic might get transferred from one NSP backbone to the other. NSPs also interconnect Metropolitan Area Exchanges (MAEs) that are similar to NAPs but are privately owned. NAPs and MAEs are also called Internet Exchange (IXs). The following image shows interconnection of NAP, NSP and MAE:

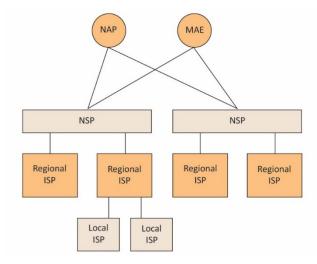


Fig. 1.5.12: Interconnection of NAP, NSP and MAE

The following figure shows the Internet routing hierarchy:

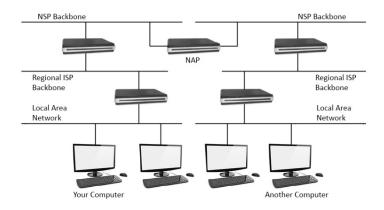


Fig. 1.5.13: Internet routing hierarchy

Types of Internet Connection

The Internet access using different types of connections is shown in the following figure:

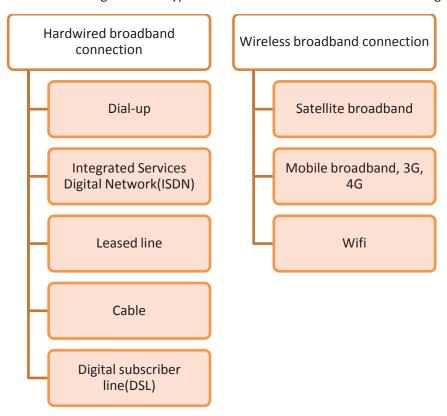


Fig. 1.5.14: Types of Internet connection

Hardwired Broadband Connection

Hardwired broadband connection is set up by connecting the devices with cables. This type of connection is further categorized into:

Dial-up

A dial-up connection is made through modem connected to an active telephone line which is not in use. The phone line is connected to the modem and the other end is inserted into the phone jack. The computer must be configured for the dial-up connection. The user has to dial a specific number that is provided by the ISP to access Internet on the computer.

The following figure shows the dial-up connection:

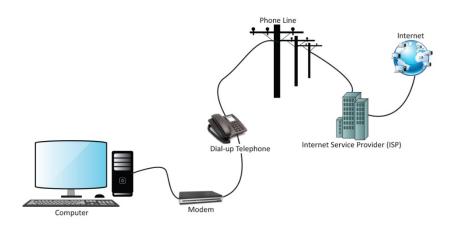


Fig. 1.5.15: Dial-up Internet connection

ISDN

ISDN is a network technology which can transport voice and digital data. Transmission of digital data is carried out over standard phone lines. There are two types of channels in ISDN connection:

- Bearer (B) channel: B channels are used for data
- Data (D) channel: D channels are mainly used for signalling and control

Various communication services such as voice calls, fax transmissions and so on can be transmitted over ISDN network. The basic ISDN line allows multiple communication devices, having different numbers to simultaneously operate and use parallel connections. End users require special phones or faxes which are capable of making ISDN connections. The following figure shows the ISDN connection:

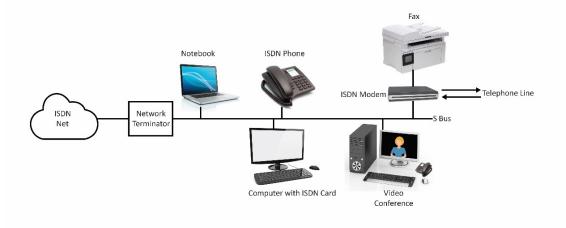


Fig. 1.5.16: ISDN connection

Leased line

Leased line provides a dedicated connection to the network for all time. It offers symmetric data connection having fixed-bandwidth.

The following figure shows the use of leased line:

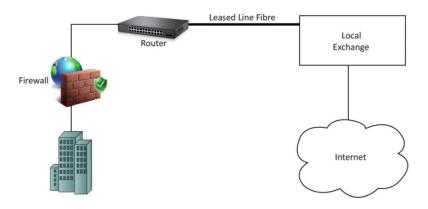


Fig. 1.5.17: Leased line connection

Cable Connection

Cable Internet connection enables access to the Internet with the help of a cable modem. Hybrid fibre coaxial cables are used for wiring. It provides network connectivity from the ISP to the end user. The following figure shows the cable connection:

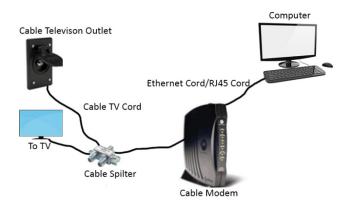


Fig. 1.5.18: Cable Connection

Digital Subscriber Line (DSL)

DSL can be operated using a single telephone line but normal use of the telephone is not affected during the use of Internet.

The following figure shows the use of DSL line for making a connection:

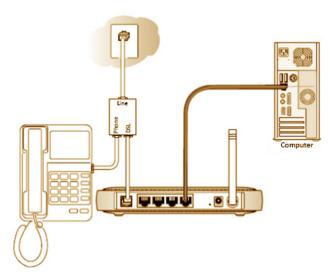


Fig. 1.5.19: DSL connection

Wireless Broadband Connection

Wireless broadband access is further categorized into:

Satellite Broadband

Satellite Internet connection provides Internet access of the following types:

- fixed,
- · portable and
- mobile

Satellite connection uses the orbiting satellites for transmitting and receiving data. It is used in those areas where wired broadband technologies such as DSL and cable are unavailable. The following image shows satellite broadband which is used for remote area:



Fig. 1.5.20: Satellite broadband

Mobile Broadband

Mobile broadband provides a wireless Internet access using a USB wireless modem, portable modem, mobile phone and other mobile devices. New infrastructure and advanced mobile technology lead to a change in fundamental nature of the service, peak data rates and new frequency bands every ten years. These changes are known as generations. The following table shows the difference between the two generations used nowadays:

Parameters	3G	4G
Data Throughput	Up to 3.1 Mbps (average	2 to 12 Mbps but
	speed: 0.5 to 1.5 Mbps)	estimated potential
		ranges from 100 to 300
		Mbps
Peak Upload Rate	5 Mbps	500 Mbps
Peak Download	100 Mbps	1 Gbps
Rate		
Frequency Band	1.8 – 2.5 GHz	2 – 8 GHz

Fig. 1.5.21: Mobile broadband



• Mbps: Mega bits per second

• Gbps: Giga bits per second. 1 Gbps= 1000 Mbps

GHz: Giga Hertz

Wi-Fi

The full form of Wi-Fi is Wireless Fidelity. Wi-Fi is a communication protocol that facilitates data transfer through wireless connection. The following figure shows Wi-Fi connection:

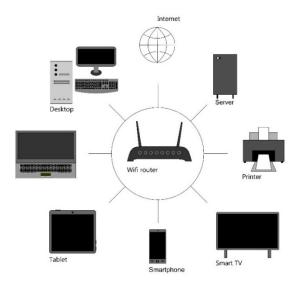


Fig. 1.5.22: Wi-Fi connection

A device within the range of Wi-Fi modem connection can be connected wirelessly to the Internet. The frequencies emitted from the connectivity ranges from 2.4GHz to 5GHz depending on the amount of data over the network.

1.5.3 Web Browser

A web browser is used to retrieve and traverse information resources available on the www.

It is a software application which provides a way to look and interact with the information on the web. The following image shows basic layout of a web browser:



Fig. 1.5.23: Layout of a web browser

It is a client program using Hypertext Transfer Protocol (HTTP) to make requests to the Web servers through Internet on behalf of the browser's user.



HTTP defines the format of messages and how they are transmitted. It also manages the actions of Web servers and browsers in response to different commands.

Browser User Interface

A browser user interface (BUI) helps the user to interact with any application that is hosted on a remote device using the controls presented in a web browser. Most of the web browsers have the following elements on the user interface:

Elements	Image	Description
Back and forward buttons	$\leftarrow \rightarrow$	Used to return to the previous resource and go to next one respectively.
Refresh or reload button	Ò	Reloads the existing page.
Stop button		Cancels the loading of the resource. This button is merged with the refresh button in some browsers.
Home button		Used to go back to the home page.

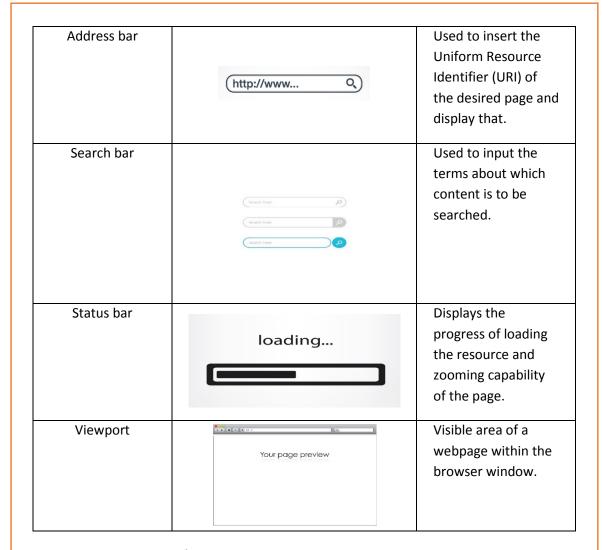
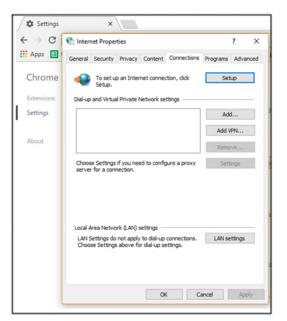


Fig. 1.5.24 Browser user interface

Configuring a Web Browser

The web browser can be customized by configuring it with the help of settings menu on the browser. A browser can be configured for managing privacy, network connection settings, appearance of the browser, download location and user accounts by going 'Show Advanced Settings'.

The following figures show configuring network connection settings from a browser:



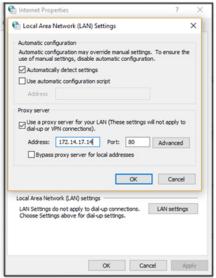


Fig. 1.5.25: Configuring network connections settings from a browser

Privacy settings of a browser help the user to manage the cache and cookies. The following figures show privacy settings option of a browser:



Fig. 1.5.26: Privacy settings option of a browser

Cookie

A cookie is a piece of information that is provided by the server to any client. A browser stores the information and sends that back to the server with some requests. Cookie can include the information which has been previously entered by the user into the form fields such as names, passwords, addresses, and credit card numbers.



One can set the time of expiry for a cookie at the time of its creation.

Cache

The cache is a temporary storage on user's computer for the files that are downloaded by the browser for displaying websites. Files contain documents which make a website such as graphic images, multimedia content, html files and so on. Cache is used for speeding up a process so that the required data need not be fetched from the original location again. A copy of visited pages are stored in cache and when the user revisits the page, it is brought from the cache.

Host Name

Every device on a computer network has a unique name or a label. This helps in identification of the device in a more readable and retainable format. It is difficult to remember IP address of each device, hence a host name is used. The following table shows the example of hostname in the given URL:

URL	Host name
pcsupport.about.com	pcsupport
images.google.com	images
products.office.com	products

Fig. 1.5.27: Host name

Information is abundantly available on Internet. It is important to ensure the privacy of data or user on any network, especially, the global network, Internet. For example, bank account information are the details which a user would not want to share with anybody as it is a very confidential information.

The user may not want to share all the information. The system may be hacked and important information may be available to unauthorized people, if the user does not incorporate privacy settings. There are various kinds of attacks from malicious resources which can be a threat to the user or data privacy:

- Phishing: To make attempt for obtaining sensitive information (username, password, credit card details) by pretending to be a trustworthy user over an electronic media of communication.
- **Spoofing:** To send communication from an unknown source but pretending as a source known to the receiver for example, email spoofing.
- Man-in-the-middle: To actively monitor, control and capture the information/communication between two users.

Privacy Management

Privacy of an individual over the network can be managed by the following ways:

- Access Control: An individual can control the access rights of his/her electronic devices so that he/she may allow those persons whom he/she trusts, to access the devices
- **Using unique password**: Individuals can use passwords that can't be easily guessed by a third party for different devices and sites.
- Deleting the cookies and cache of the browser at a regular interval.
- Avoiding using the public network such as Wi-Fi at station and cafeteria for payment and viewing card details.
- Using virtual private networks (VPNs) that serve as encrypted tunnel to prevent stealing of login credentials or other crucial data
- Avoiding storing of private data in cloud storage.
- Securing online accounts with 2 step authentications. For example, Gmail has a 2-step authentication process.
- Securing connections with firewalls and anti-virus software services

1.5.5 Cyber Security

Cyber security is a technique for protecting computers, data, programs and networks from unauthorized access. Cyber security provides protection to a computer system from any damage to the hardware or software or theft of information from the system. It is known also as computer security and IT security.

It protects the hardware by controlling access to it. It protects against any harm which may arrive through network access, data injection or any other causes. Cyber security techniques may be categorized as follows:

Application Security

Application security protects application from threats during the development of the application.

Information Security

Information security provides protection to information against unauthorized access and ensures privacy.

Network Security

Network security includes mechanisms to protect the reliability, usability and safety of the network. It stops the threats from entering and spreading over the network. Network security components include:

- Anti-virus to detect and destroy computer viruses
- Anti-spyware to remove unwanted programs which are installed in the computer without knowledge of the user
- Firewall
- Virtual Private Networks (VPNs) that provides the system secure remote access.

Cyberlaw and IT Act Regarding Software Piracy

Software piracy is an illegal and unauthorized distribution, downloading and use of software. Software piracy refers to downloading and using of software without having its proper license. It also includes use of single license simultaneously or loading that in more than one devices.

In India, punishment for software piracy is covered under Indian Copyright Act 1957. Section 63B of IT Act 1957 states that if one uses a software without taking the permission of the owner of the legal right of the software, it is an offence. The person using this will be punished with

- Imprisonment which will be more than seven days. The term may also extend to three vears
- Fine which will be more than fifty thousand rupees. The fine amount may extend to two lakh rupees.



Copyright is the legal right given to the owner for his creation of literary and artistic works.

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Choose the correct answer for the following questions.

- 1. When data is sent to the Internet by a computer, it is known as _____
 - a. Download
- b. Upload
- c. Email
- 2. A packet may jump from one NSP backbone to the other at _____
 - a. WAP
- b. ISP

- c. NAP
- 3. Visible area of a webpage within the browser window is called ______
 - a. Viewport
- b. BUI
- c. Display

Activity 🏂



Match the followings.

1. 3G

a. Browser

2. Address Bar

b. Repository

3. Safari

c. Protocol

4. Cache

d. Mobile Broadband

5. HTTP

e. URI









2. Computer Troubleshooting, Maintenance and Repair

Unit 2.1 - Computer Troubleshooting

Unit 2.2 – Computer Maintenance and Repair



Key Learning Outcomes



At the end of this module, you will be able to:

- 1. Identify the faulty module and perform troubleshooting
- 2. Analyse the error codes and messages
- 3. Implement maintenance and repair
- 4. Execute assembling and disassembling of computers
- 5. Explain E-waste management

UNIT 2.1: Computer Troubleshooting

Unit Objectives



At the end of this unit, you will be able to:

- 1. List the general steps for troubleshooting
- 2. Distinguish between hardware problem and software problem
- 3. Identify the faulty module and perform troubleshooting
- 4. Analyse the error codes and messages

2.1.1 Troubleshooting

Troubleshooting refers to repair of faulty products or processes. Troubleshooting begins with searching the source of a problem and ends with finding the solution of that problem to ensure that the product or process functioning properly. Good troubleshooting consists of following four steps:

- Identification of the symptoms
- Elimination of the causes of a problem
- Verification of the solution
- Restoration of the product or process

In other words, the first thing to do is to identify the symptoms that are causing a failure in the system. The next step is to diagnose the cause of that malfunction, till a solution is reached. This is followed by returning the product to its original state.

Proper knowledge and understanding of the behaviour of each of the components of a computer system is necessary. The following figure shows the concept of troubleshooting:



Fig. 2.1.1: Concept of troubleshooting

The service engineer should follow some simple steps for troubleshooting as shown in the following figure:



Fig. 2.1.2: Steps for troubleshooting

2.1.2 Distinguishing a Software Issue from a Hardware Issue

The first step of troubleshooting is to be determining whether the problem is caused by a failure of hardware or software.

Software Problems

Software problem manifest itself as freezing of computer, pages not getting loaded, or glitches during playing games, or movies from the computer. A computer needs device drivers to perform these functions. If the correct drivers are not installed, it will lead to software issues. The only way to resolve such a situation is to install correct drivers followed by re-installing the software or upgrading the Windows program.

Hardware Problems

Hardware failures are responsible for problems such as when the user is not able to switch on the computer or is faced with blue screen or overheating of computer. A computer can function only when all the components work well together. Consider a scenario, there is a broken hard drive, which implies that it doesn't work. Alternatively, it can also mean that it is slow and booting is not finished or it shows an error message on the screen indicating that one of the hardware components of the system is having a problem.

As compared to software issues, hardware issues are harder to tackle as a process is needed to find out exactly which component is not working properly.

2.1.3 Troubleshooting Steps for Software Issues on Windows

When troubleshooting software issues in a computer, the service engineer should ensure that correct drivers are installed on that system. The service engineer should know how to use hardware troubleshooter, how to configure a device, how to download as well as install and update device drivers.

Using Windows 7 Troubleshooter

To run the Hardware and Devices Troubleshooter in Windows 7:

- Click on the Start button and select Control Panel
- In search box, type 'troubleshooter' and then click on Troubleshooting
- Select Configure a device under Hardware and Sound tab

Downloading and Installing a Driver

- Select the **Start** button, then in the search box, type "device manager", and then select **Device Manager**.
- Find the device that needs to be updated
- Double-click the device name
- Select the **Driver** tab, click on **Update Driver**

Updating Device Driver Using Windows Update:

- Select the Start button, and in the search box, type "Windows Update"
- Select Windows Update
- Click on Check for updates available in the left pane
- On the page that displays **Select the updates you want to install**, select the check box for the driver that needs to be installed, and then select **OK**
- On the Windows Update page, select Install updates.

2.1.4 Troubleshooting of Some Common Issues -

The IT landscape of an organization consists of two components, hardware and software. The typical hardware used within an organization are; Servers, Personal Computers, Server racks, Laptops, Monitors, Printers, Video Conferencing equipment, routers, switches and so on. The related software used are, AUTO CAD, Adobe software, Video Conferencing software and device drivers. Problems related to computer hardware can be known by running a hardware diagnostics.

Hardware Diagnostics

Hardware diagnostics is run on most computers. It is used to check the health of the system and detect faults in normal operations of computers.

The different types of tests are:

Power on Self Tests (POST)

POST is an in-built diagnostic tool that starts as soon as the processor of a computer starts. POST verifies that the various hardware components such as the random access memory,

keyboard and disk drives are functioning properly. If POST is successful then the computer begins to boot else BIOS issues an error message. The error message is in form of a series of beeps. These beeps may have a pattern of long beeps or short beeps or a combination of the two depending on the nature of the problem. The pattern of beep conveys information about the type of the fault detected. For example, if the POST is unable to detect the processor, it will stop the boot process and convey the message through a code of beeps.

Out of Service Tests (OST)

POST can test the internal functioning of the card. But, it is unable to test the external interface logic of that. There are two types of test that can test the external interfaces of the card with other boards in the system. These are shown in the following figure:

Interface Tests

• The card which is under test, is labelled as out of service. The adjacent cards are configured to operate in the interface test mode. The card under test is instructed to run the test. The cards are then brought out of the test mode and restored.

Echo Back Test

 The card is set to echo back mode. The interface after receiving the data, echoes it back to the card under test. The card being tested receives the data transmitted by it, back.

Fig. 2.1.3: Out of service tests

In-Service Monitoring

In this method, the health of the card is verified when it is operating, using any of the following two ways:

Transient error monitoring • Transient errors are caused by fluctuations in power, spikes and interference from other cards. They can occur even when the hardware is functioning normally. In case of frequent errors, complete hardware diagnostics of the system is needed to isolate the issue.

Link monitoring •This method monitors the bit rate on the links in order to get advance warning. When a certain threshold is exceeded by the bit error rate, a diagnostics may be triggered.

Fig. 2.1.4: In-service monitoring

The following table lists some common hardware problems and their solutions:

Issue	Diagnosis	Solution
Printer Error (Orange or Blinking Light)	No Light in Power Indicator of Printer	 Ensure that the printer is switched on. Reconnect all the printer cables. Switch off the printer and turn it on again.
	No Paper or Paper Jam	 Ensure that the printer has paper. Remove any paper stuck in the roller. Restart the printer. Try printing again.
No Flashing Light but Cables Properly Connected	No Printer Driver	 Check the printer driver If needed, update the driver. Check the connectivity of printer using print manager. If the printer is a parallel port printer, verify the following settings: Enter the computer's CMOS setup. Enable the parallel port. Ensure that the printer is on parallel port mode. Disconnect devices such as scanner or zip drive if they are parallel with the printer to ensure that they are not causing issues with the printer.
A Program is Not Responding.	The Computer is Frozen	 Press the Ctrl +Alt+Delete keys. Highlight the program's name in the Task Manager and. Then click on the End Task button. Turn off the computer manually by pressing the on/off button. Once the computer is responds again, run a virus check.

The Keyboard is Not Working	Improper Connection	 Make sure that the keyboard is properly connected to computer.
		 In case of wireless keyboard, try changing the batteries.
	Key Got Stuck	Switch off the computer
		Clean the keyboard with a damp cloth.
		 Restart the computer using the mouse.
New Hardware or Software is Working Incorrectly.	Incompatibility Issue with System Configuration	 Check that the computer meets the requirements of the program or utility. Uninstall the program and then reinstall it.
The Mouse is Not Working	Improper Connection	 Ensure that the mouse is securely plugged into the computer.
Correctly.		 Ensure that the cord is not damaged.
		 If the mouse is plugged into a USB hub or USB switch box, remove it and plug it directly into
		the computer.
		 In case of a cordless mouse, re- establish the connection by pushing the connection button on the underside of the mouse.
		Clean the mouse thoroughly.
The Computer has No Sound.	Problem in Sound Card or Audio Driver Improper Sound Settings	 Go to volume control in the system tray and check the volume and mute check boxes. Check the input and output wires of the speakers. Check the functioning of audio drivers. Check the functioning of the sound card.

PC Not Connecting to the Network through LAN	Problem in Network Configuration	 Go to network setting and check that the Ethernet is enabled. Check the working of modem. Check all the wires and connections. Check the LAN card. Check the IP Address and DNS settings.
No Power	Improper Connection Faulty PSU or SMPS Unit	 Ensure that the power cord is plugged into the supply. Check whether PSU is putting out enough voltage. Switch off the system and unplug all devices. Reinstall the devices one by one and keep switching on the computer after each device is reinstalled. If the system does not start after installing any component, replace the component. Check the SMPS unit. If the system doesn't come on after reinstalling all the devices, it may be a motherboard or CPU problem.
Blank Screen, Nothing Appears on the Screen	Improper Connection or Display Settings	 Check if monitor and CPU power is in On position. Check if monitor is plugged in to the CPU. Ensure that the power cable is plugged in the monitor and is not loose. Some CPU has multiple ports for display, check each port by plugging in securely. When the power button is pressed on the monitor and some status is displayed, this means the power to the monitor is in On position and the screen display is okay. Check the cable runing from the CPU to the monitor

	Check the brightness level using the
	menu button on the monitor. It may
	have been set to dark.
	Check that the computer is not in the
	screensaver or sleep mode.
Computer	Ensure that the power cable is
Doesn't Power Up	properly plugged in to the CPU and monitor.
	Check the power socket.
	 Replace the power socket with a
	different one, or if power extension
	board is used, plug the power
	directly into the socket.
	Replace the power cable.
	Check if the LED at front of the Department in the properties of the prope
	monitor is in On position. If yes, then CPU must be at fault.
	If LED at CPU is in On position then it
	might be monitor issue.
	If none of the LED is in On position,
	then it may be a local power issue.

Fig. 2.1.5: Hardware problems

System Issues

Problem/ Symptoms	Action
Devices Not Listed in BIOS	 Ensure that the drive is installed properly Ensure that the cables are connected properly.
No Operating System Found or Similar Message	 Ensure that the system is set to boot from the right device. Ensure that the proper boot order is listed under the Boot menu. Remove any non-bootable DVD from the drive. Ensure that the boot drive is the first option. Once boot drive is found, the OS begins to load it.

Non-Working Devices/Device Not Recognized	 Ensure that cables are plugged in. Ensure proper connection of the cables to the device. Check that the add-on cards are inserted in their respective slots. Check the device drivers. Try reinstalling the existing device driver or downloading the latest version of it. Try to uninstall and reinstall the device.
Problems After Installing New Software or Device Driver	 Uninstall the software or driver Run System Restore to get the system to a previous state in which it was working. Try booting the system in Safe Mode and then run the restore option. Restart the system Press the F8 key continuously. Select Safe Mode from the menu displayed and press enter. Start system restore.
Spontaneous Reboots	 A computer that reboots often is an indication of a bad power supply. Check PSU and SMPS unit. Check if there is a loose connection.
System Time Keeps Changing	 If the time/date clock needs to be se constantly, replace the CMOS battery.
Nothing Happens when Power Button is hit	 Check the power connection. Ensure the connection of cable from the case power button to respective connector on the motherboard. Test the motherboard power connections. Inspect the floppy power cable. Unplug everything from the motherboard except power cable, processor, video card, and memory. If it does not power up, it indicates that either case power supply or motherboard is defective.

System Turns On, but Begins to Boot Up	 Check all connections twice and try again. Detach everything from the motherboard except video card, memory, power button wire, and processor and perform the test again. If the computer starts, reconnect the components after turning off the power. If it does not boot up, more than one part may be defective.
System Turns On but Does Not Boot and Produce Beep Sounds Irregularly,	 Ensure that the RAM is installed correctly. Try removing and re-installing it.
System Turns On, Produces Fast Beep Sounds, and Does Not Boot	Inspect that the video card is fitted properly in the AGP or PCI slot.
System Freezes Intermittently while Installing the OS	 Verify that the heat sink fan is spinning Ensure that the heat sink is mounted properly Make sure that the heat sink is kept parallel to the processor surface.
Blue Screens Errors, Problems in Installing OS	Check the memory(RAM)Check the hard-drive.

Fig. 2.1.6: System issues

2.1.5 POST Beep Codes

If the computer emits beep codes after it is turned on, it implies that the system has encountered a problem before it could display any error information on the monitor.

Follow the steps described in the given figure to determine the system problem represented by the beep code:

Switch on the computer

If it's on, shut down and restart it

Listen to the beep codes sounds when the computer begins to boot

Note the number of beeps and recognize the beep codes

Fig. 2.1.7: Steps for determining beep codes

The following beep codes are for AMI BIOS:

Beeps and Error	Resolution
1 Beep – indicates Refresh Failure	Reinsert or replace memory and try troubleshooting motherboard.
2 Beeps – represents Parity Error	Reinsert or replace memory and try troubleshooting of motherboard.
3 Beeps – signifies Memory Error (first 64KB)	Reinsert memory or replace it.
4 Beeps – represents Failure of Timer	Troubleshoot motherboard.
5 Beeps – represents Failure of Processor	Try troubleshooting of the CPU and the motherboard.
6 Beeps – indicates Failure of Keyboard Controller	Perform troubleshooting of keyboard and motherboard.
7 Beeps – represents Virtual Mode Exception Error	Perform troubleshooting of CPU and the motherboard.
8 Beeps – indicates Failure of Display Memory	Try to troubleshoot the motherboard and graphics card.

9 Beeps – indicates failure of ROM BIOS	Replace ROM BIOS and perform the
Checksum	troubleshooting of motherboard.
10 Beeps – indicates failure of CMOS Shutdown Register	Perform troubleshooting of motherboard.
11 Beeps – indicates failure of L2 Cache	Try to troubleshoot motherboard and L2 cache.
Continuous Beeps – signifies failure of Memory or Video	Perform troubleshooting of memory, motherboard and graphics card.

Fig. 2.1.8: Beep codes

2.1.6 Understanding Error Messages

The following table lists the common error codes faced while using Windows and its basic components. Some solutions have been provided to solve them:

Error Code	Error Message
Code 1	Incorrect device configuration
Code 3	Corrupt device driver, or low system memory
Code 10	The device is not able to start.
Code 12	Not enough free resources for the device to use. Disable any of other devices to free resources on this system.
Code 14	Restart the system for the device to operate
Code 16	Windows unable to identify resources used by the device
Code 18	Reinstall the device driver
Code 19	Incomplete or damaged configuration information. Reinstall the hardware component.
Code 21	Device has been removed
Code 22	Device has been disabled
Code 24	Device not present or driver not installed
Code 28	Device driver not installed.

Code 31	Windows unable to load the device
	drivers
Code 32	Device driver disabled
Code 33	Windows cannot determine the resources
	that are required by the device.
Code 34	Cannot determine device settings
Code 35	Not sufficient information to configure
	the device and use it.
Code 36	Reconfigure the interrupt for this device.
Code 37	Unable to start the device driver for the
	hardware.
Code 38	Previous device driver is still in memory
Code 39	Device driver corrupted or missing.
Code 40	Incorrect or missing service key
	information in the registry
Code 41	Windows unable to find the hardware
	device
Code 42	Duplicate device is running on the system.
Code 43	Device stopped working
Code 44	Device shut down by an application
Code 45	Device not connected to the system.
	Device not connected to the system
Code 46	Operating system shutting down.
Code 47	Device ready for safe removal, but still has
	not been removed
Code 48	Software for this device has been blocked
Code 49	Windows cannot start new hardware
	devices due to the large system hive.
Code 52	Windows unable to verify the digital
	signature for the device driver

Fig. 2.1.9: Error codes

2.1.7 Some Basic Troubleshooting Tips ———

The table lists some basic troubleshooting tips after installing new components

New Component	Issue	Actions
Monitor	Picture is not visible	 Check the signal cable connections Ensure that the computer is switched on Check the brightness settings
	Screen not in the center position	 Make adjustment to the H-Size, H-Phase or V-Size, V-Center controls. Check the system's signal timing
	Too bright or too dark screen	 Check the Brightness and contrast settings Test the voltage level Inspect the signal timing of the system Inspect the horizontal frequency.
	The screen is shaking	 Move all objects such as a motor or transformer, which emit magnetic field, away from the monitor. Test the voltage level Inspect the signal timing system
Hard Drive	Blank screen when the system is powered up	 Plug-in the monitor Inspect all cards Make sure that the video card is in right slot Ensure the video card is secured using mounting screws. Turn the computer off Take the drive host adapter out If, after reboot, the screen turns on, the host adapter is either incompatible or

Computer does not boot and	• Inspect whether the BIO	ς
no error message appears on	supports drives.	J
the screen		٦
the screen	 Shut down the system an remove the new drive 	u
		_
	Move the jumper onto th	
	alternate-capacity jumper.	
	Remount the drive in th	e
	system	
	 Insert a bootable syster 	
	diskette into drive A an	d
	start the system.	
	 Insert the Disc Wizar 	d
	diskette into drive A	
	 Type A:XDM and presenter. 	S
	 Follow instruction of th 	e
	Disk Manager	
	 Install the dynamic driv 	e
	overlay and partition	
	 Perform formatting of th 	٩
	new drive	_
	Reboot the system	
The system does not	Inspect all cables	
recognize the drive	 Inspect an casics Inspect power supply 	
recognize the drive		ل
	 Reboot the system an check if the drive motor 	
)[
	starts up or not.	
	If it does not start up, check	K
	again all drive cables.	
	 Inspect the drive-type liste 	
	in the system setu	p
	program for each drive	
	• Press th	_
	CTRL+ALT+DELETE keys t	0
	reboot the system	
	 If the system has a turb 	0
	switch, keep it in slov	N
	speed before starting th	e
	system.	
	• If no turbo switch	is
	available, use keyboar	d
	commands.	
	 Set the processor to fas 	st
	speed after the compute	
	starts,	••
	J. (1)	

	•	Warm-boot the system after every start. Inspect for any I/O address conflicts. Ensure there is no compatibility issue with the drive and host adapter. Turn the computer off Remove the peripheral adapter cards except the video card and host adapter. If the computer can recognize the drive after
	•	rebooting, turn it off. Reinstall the other cards, one by one, until there is any conflict. Isolate the source of the address conflict Resolve the conflict by changing the I/O address of the peripheral that appears to cause the conflict. Ensure that there is no diskette in drive A and reboot.
The system fails to create/save the partition record or gets hanged in FDISK command	•	Inspect all cables Make sure that the setup system diskette is uncorrupted. Use a backup diskette Create smaller partitions Change the settings of the interrupt jumper on the host adapter. Disable the Track 0 protection, before using FDISK, in the system setup program. Re-enable Track 0 protection after FDISK is done.

The DOS message "Disk Boot Failure," "Non-System Disk" or "No ROM Basic - SYSTEM HALTED" appears The system displays an error message, "HDD controller failure" appears	 Use the DOS SYS utility to reinstall the DOS system files. Inspect all cables. Use FDISK to make sure that the primary partition is active. Check for viruses. Inspect the settings of the jumper on the drive. Verify the settings of drivetype in system setup
System in-operative. Lights on Keyboard and power indicator are on and hard drive is spinning.	 Expansion card is not fitted properly in its slot on the motherboard. Turn the computer off. Ensure all cards are securely seated in slots Press the card firmly with even pressure on both ends of the card. Floppy disk drive or tape drive is defective. Turn off the system. Disconnect all cables from any floppy drive. Turn the system on and check if the keyboard operates. Repeat the steps until the defective unit is located.
System can be booted from floppy disk drive but not from HDD	 Check the connector between hard drive and system board Inspect cable between disk and disk controller on the board. Check that cable ends are plugged in securely Inspect the drive type in the Standard CMOS Settings Damaged HDD or Disk Controller. Format HDD If not able to do so, HDD may be defective.

	Г	
	System boots only from Floppy Disk. HDD can be read and applications can be used, but booting from HDD is not possible	 Hard Disk directory or FAT is scrambled. Run the FDISK program Format HDD. Copy the backup data onto HDD. Hard Disk boot program has been damaged. Create back up of files. Format the HDD. Re-install applications and files by using backup disks. Inspect cable between disk to disk controller. Ensure that both ends are plugged in securely. Inspect the drive type in Standard CMOS Setup
	Screen message displays, "Invalid Configuration" or "CMOS Failure"	 Check the configuration settings. Replace incorrect information.
	Unable to boot system after installing second HDD.	 Check whether the master /Slave jumpers are set properly. Run SETUP program and select appropriate drive types.
New Network Card	Unable to connect to a server	 Load the driver and ensure that the protocols are bound. Inspect the Device Properties Use the diagnostic utilities to test the NIC adapter Check if additional networking software needs to be installed.

Fig. 2.1.10: Troubleshooting process

2.1.8 Blue Screen of Death (BSoD)

A BSoD is an error screen which is shown on a Windows computer after a system crash. System crash occurs when the OS reaches a condition from where it can't operate safely.

BSoD, as shown in the following figures, is present in Windows since the earliest version of Windows NT family and present in all Windows OS which were released afterwards.





Fig. 2.1.11: Blue screen of death

The following figure lists some reasons that can cause blue screen error:

- •Incompatible versions of dynamic link library (DLLs)
- •Hardware incompatibilities or malfunctioning
- •Faulty or poor device drivers
- Insufficient power supply
- Overheating of computer
- •Hardware running beyond the specification limit

Fig. 2.1.12: Reasons for blue screen of death



DLL involves the concept of shared library in the Windows OS. These shared libraries typically have file extensions such as DLL, OCX or DRV.

The blue screen error can be resolved in different ways depending on the cause. The user has to diagnose the system and identify the cause first. The following figure shows the different ways to fix blue screen error: **System Restore** Used to roll back the system to working state. Scan for Malware gets deep into the Windows kernel and can cause instability for Malware the system. Scan the computer for malware to ensure that malicious software isn't the cause for the crash. **Install Updated** An faulty driver can lead to crashes. Install latest drivers for the **Drivers** computer's hardware. **Boot Into Safe** If the computer is having blue-screen every time it is turned on, booting Mode into safe mode can fix the problem. Check for Try testing memory for errors and checking the temperature for ensuring Hardware that it isn't overheated. **Problems** Reinstall Reinstalling Windows for blowing away the existing system software,. Windows Fig. 2.1.13: Different ways to fix blue screen error

Activity 🚉



Choose the correct answer for the following questions.

- 1. When a processor is turned on, a diagnostic tool tests if the computer hardware components are working properly or not. The tool is _____
 - a. POST
- b. OST
- c. IST
- 2. Which command opens a Task Manager?

 - a. Shift+Ctrl+F1 b. Ctrl+Alt+Delete c. Ctrl+Alt
- 3. 5 Beeps at the time of running Power on Self Test means ___
 - a. Processor Failure
- b. Timer Failure
- c. Memory Error

Activity 🚉

Troubleshoot a system in which there is no POST.

Activity 🚉



Perform the task of troubleshooting of 5 beep POST error.

Activity



You are given faulty motherboard. How would you analyse the type of failure in the motherboard?

Activity 🙀



You received a customer complaint that the laptop is not giving audio output. How would you troubleshoot the problem?

Components:

- System with faulty sound card
- Flat/Phillips screwdrivers
- Screws
- Sound card
- Correct drive cables (IDE or SCSI)
- Audio cable to attach CD-ROM drive to sound card
- Installation disk for the new sound card

UNIT 2.2: Computer Maintenance and Repair

Unit Objectives



At the end of this unit, you will be able to:

- 1. Recognize the importance of maintenance
- 2. Identify the monitoring tools
- 3. Execute assembling and disassembling of computers
- 4. Recognize the ways for E-waste management

2.2.1 Maintenance

Computer maintenance refers to the activities carried out to have computer systems and subsystems in good working order. One of the major components of hardware maintenance is regular and periodic cleaning to ensure that dust and debris do not hinder the performance of a computer. Physical cleaning of the interior and exterior of a computer consists of removing dust and debris from hardware components such as keyboards, cooling fans, and power supplies.

Regular computer cleaning helps prevent problems such as short circuits and overheating. Computer maintenance consists of:

- **System Maintenance:** System management includes scheduled and periodic activities that should be performed to maintain the system such as manage hard drive space, scan for system errors, virus protection and defragment the hard drive regularly.
- Physical Maintenance: To maintain hardware components of a computer, it is
 important to keep them clean and away from dust and dirt as well as avoid extreme
 temperature changes. Take care to keep liquids away from the computer. Wipe the
 monitor and keyboard regularly with a soft cloth and avoid using solvents to clean a
 computer.

The following figure shows system maintenance and physical maintenance:



Fig. 2.2.1: System maintenance and physical maintenance

The following figure explains different types of maintenance:

Preventive Maintenance

•This is performed even if the computer is still operating at its efficient level. It is done to prevent degradation of performance.

Corrective / Breakdown Maintenance

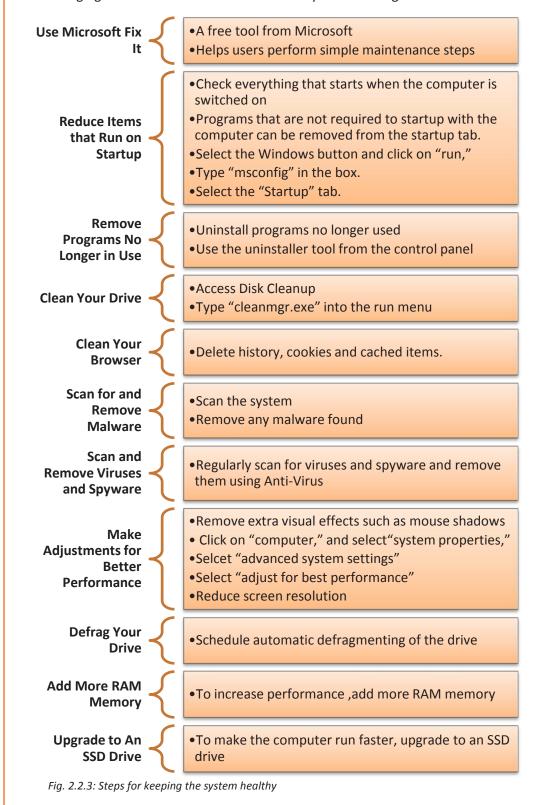
•This type of maintenance is required when a system or subsystem collapses.

Routine Maintenance

 This involves a regular and scheduled maintenance service to perform an overhaul of machinery.

Fig. 2.2.2: Types of computer maintenance

Proper maintenance of a computer can keep the computer to run smoothly for years. To keep a system efficient and to ensure fewer breakdowns, the steps as shown in the following figure should be advised to the user by a service engineer:



2.2.2 Software Maintenance

Software maintenance refers to the alterations and updating done in a software product after its delivery with a view to correct defects or to improve performance. Software maintenance involves correcting errors, enhancing the capabilities, deleting outdated capabilities and optimization.

There are four types of software management techniques as shown in the following figure:

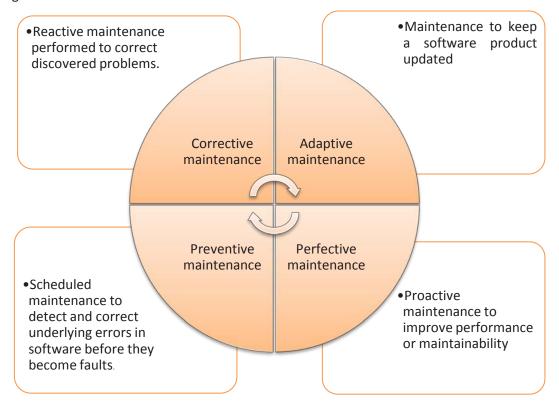


Fig. 2.2.4: Types of software management techniques

Need of Software Maintenance

A lot of corrective or non-corrective software actions can lead to changes in software. Maintenance must be performed in order to ensure:

- Correction of faults
- Improvement in design
- Implementation of enhancements
- Improvement in interface with other software
- Adapting programs to enable use of different hardware, software or system features
- Migration of legacy software

The five key features of maintenance activities are shown in the following figure:

- Controlling day-to-day functions of software
- Controlling modification of software
- Perfecting existing functions
- Recognizing security threats
- Patching security vulnerabilities
- Preventing degradation of software performance

Fig. 2.2.5: Maintenance activities

Software Update

Regular updates are essential to correct software bugs and deal with security weaknesses in software packages and operating systems. It might not be important to update a program that is not used regularly, but there are some programs such as OS, browser and antivirus that must be updated on a consistent basis.



Never ever skip updating security suites as they protect the computer. The security suites should be updated regularly.

Not updating important software, such as OS, antivirus or antimalware program or browser, may lead to system crashes, problems, bugs and other issues. The following figure describes the importance of updating software:

Better Functionality

Updating the software will provide feature and speed enhancements.

Safety from Security Vulnerabilities

Updates provide safety from known security holes. When there is a new release, logs and update notes reveal previously-known exploits that have already been patched.

Squashing Bugs

Due to continuous development of the software, bugs start to appear. Updates fix the bugs and provide more efficient software.

Fig. 2.2.6: Importance of updating software

There are a variety of ways to update software, as described in the following figure: Automatic Updates ☐ If a computer is on an Internet connection, allow the programs to automatically download and install updates □When setting up a new computer with Microsoft Windows, select automatic updates for a Windows operating system Automatic Alerts for Updates □If the Internet connection is slow, have the computer automatically check for updates □Do not download or install them □An alert appears stating that updates are pending □Install the updates when the internet is faster Manual Updating ☐Turn off automatic update □Select manual updates □Click on "check for updates" when connected to the Internet Offline Updating •If a computer does not have access to the Internet, download updates from a computer that is connected to the Internet •Use a disk or flash drive to transfer them to the computer which needs to install the updates •Ifseveral computers need the same update, then one computer can download

Fig. 2.2.7: Ways for updating software

the update and share amongst all the computers

Malware Issue

Malicious software or Malware is any software created with an intent to harm a computer by disrupting operations, gathering delicate information, acquiring access to one's private computer systems or displaying undesirable advertising without the knowledge or permission of the owner.

Malware takes advantage of any security defect such as bugs or any other vulnerability in the design of the OS, applications, and susceptible versions of browser plug-ins such as Flash Player, Acrobat Reader. At times, even after new versions of such plug-ins are installed, the old versions do not get uninstalled.

Programs have been specifically developed to combat malware. Some of these programs are:

Anti-virus and Anti-Malware Software

Antivirus software, also referred to as anti-malware software, is a software that helps to prevent, detect and remove unwanted, malicious software from a computer.

Malicious software of malware is a software used to harm the computer and disrupt its functioning with the intention of gathering personal information from the computer. In absence of a good antivirus software, hackers can infect the school computers with malware and steal sensitive data such as passwords, personal data, and identity.

Anti-malware programs can fight malware in two ways as shown in the following figure:

Anti Malware Program

- 1. Offers real time protection against installation of any malware software on a system.
- 2. Searches for malware in incoming data
- 3. Blocks any threat it finds
- 1. Detects and removes already installed malware
- 2. Scans the contents of the Windows registry, OS files and programs installed on a computer
- 3. Provides a list of threats found
- 4. Enables the user to select which files to keep, or to compare and remove files that match the list of known malware

Fig. 2.2.8: Ways for combating malwares

• Website security scans

When a malware compromises a website it harms the reputation of the website and may even lead to getting blacklisted in search engines.

Website security scans use automated software tools to perform tests and checks on a website in order to find the potential vulnerabilities in the application and report any security issues found.

Patch

A patch is a piece of software code that is used to correct an issue, usually called a bug, in a software program or an operating system. Patches enable users to fix security vulnerabilities improve the usability or performance of a program. Patches can also help in preventing malware attacks by constantly updating the software.

2.2.3 Windows Maintenance

Maintenance of an OS includes keeping the OS, in this case Windows, and all its applications up-to-date, keeping the OS secure, and preventing from antivirus or malware entering the OS. A few built-in system maintenance tools available in Windows operating system are:

Performance Monitor

The Performance Monitor is an application that allows the user to observe CPU or memory usage by programs running on a computer. It can be used to view the performance of a system either in real time or at a later time by collecting information in a log.

Computer Management and Administrative Tools

Computer Management and Administrative Tools are a set of advanced tools that help a user or an administrator manage a computer. These tools are contained in a single folder in Control Panel to enable users to have an easy access and can be opened by selecting Computer Management application. This window contains the tools as shown in the following figure:

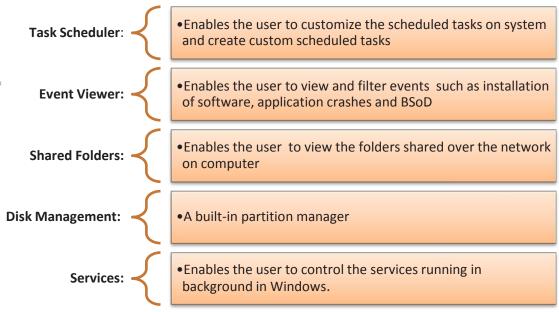


Fig. 2.2.9: Computer management application content

The Administrative Tools also contains some utilities such as the Windows Firewall along with Advanced Security application which helps the user in creating advanced firewall rules.

Advanced User Accounts Tool

The Advanced User Accounts tool enables a user to manage different user accounts on a computer. It can be opened by typing either 'netplwiz' or 'control userpasswords2' in the RUN dialog box of the start menu.

Disk Clean-up

Windows' Disk Cleanup utility enables the user to free up disk space on a computer's hard drive. It searches the system for temporary files, memory dumps to previous system restore points and leftover files from Windows upgrades. These unnecessary files can then be deleted. To access it, open the Start menu or Start screen and search for Disk Clean-up.

Group Policy Editor

The Group Policy Editor enables the system administrator to customize and lock down PCs on a network. It is available only on Professional or Ultimate editions of Windows. On Windows 8, it enables the user to skip directly to the log-in screen by disabling the lock screen. It can be accessed by typing gpedit.msc at the Start menu.

Registry Editor

The registry includes essential information on operating system, installed applications as well as personal settings for each application or user. Certain window specific issue can be resolved only by manually editing the registry. Registry editor enables the user to create, manipulate or delete registry keys and values. To access it, open the Start menu or Start screen and type 'regedit'.

MS Config

The System Configuration window controls the start-up programs on Windows OS. It also enables the user to customize the boot loader. It can be launched by typing 'msconfig' into the Start menu or Start screen. However, Windows 8 onwards a start-up program manager is built into the Task Manager itself.

System Information

The System Information utility allows the user to acquire system configuration information related to the hardware, software and drivers installed on the current computer. It collects data from the registry, initialization files and operating modules and displays it in hierarchical view. To access it, 'System Information' is to be searched in the the Start menu or Start screen.

Disk Defragmenter

There may be times when a disk defrag process has to be stopped mid-way. The main function of the disk defragmenter is to ensure that terminating the defrag process at any time does not lead to any adverse effect. It enables the user to defrag multiple volumes simultaneously. The following figure shows the steps for launching the disk defragmenter:



Fig 2.2.10: Steps for launching disk defragmenter

System Restore

In case of situations such as system crash, important system files, registry keys and installed programs can get corrupted. Windows has an in-built System Restore utility which allows the user to reverse certain changes made to an operating system so that the critical programs can be returned to a previous state in case of any disaster.

2.2.4 Computer Hardware Maintenance

Computer hardware is generally reliable and most computer problems are related to software issues. However, computer hardware can become damaged over time and hardware maintenance is necessary for keeping computers up and running.

The physical components of a computer such as monitor, data storage, HDD, graphic card, keyboard, sound card, RAM and motherboard are very susceptible to dust and dirt. Computer hardware maintenance entails taking care of and keeping these components in good working condition.

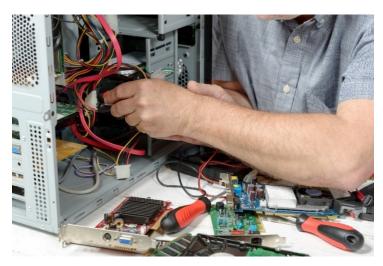


Fig. 2.2.11: Computer hardware maintenance

Most of the common hardware problems can be avoided by taking the following preventive measures:

Dust Control

An important part of computer maintenance is preventing dust from accumulating in a computer. Dust can lead to mechanical failures in computer components with moving parts. It is very important to regularly dust or wipe the computer with a dry cloth or duster. The use of dust covers is advised as it minimizes dust. In addition, care should be taken to blow out dust that has built up inside the computer case by using compressed air.

Heat Control

Computer parts especially the CPU, produce a large amount of heat while operating. If this heat is not allowed to dissipate, computer can get damaged due to overheating.

This is the reason why computers have fans and heat sinks. It is therefore important that the air flow to the computer is not blocked. It is also not advised to use a desktop in an enclosed cabinet. A laptop should not be left running for long durations on a soft surface such as a bed or a sofa.

• Surge Protection

If the electrical supply does not have a uniform and well controlled voltage, it will lead to voltage surges. Voltage surges can also be caused due to thunderstorms or when power returns after an outage. These voltage surges cause a lot of damage to the computers and it is important to protect against such events. Surge protection can be provided by following ways:

- Use surge protecting power strips: These devices contain a fuse that shields 4 or 5 outlets. In the event of a power surge, the fuse gets blown thereby protecting the computers.
- Use surge suppressor: Install surge suppressor at the point of entry of the main power. All the electrical components plugged in to electrical sockets within the room will be protected in case of a power surge.
- Use uninterrupted power supplies (UPSs): A UPS protects the computers by controlling the voltage sent to the sockets located on the UPS. It also contains a battery that enables the computers to continue operation even after a power outage.

Computer hardware maintenance also includes other types of maintenance as shown in the following figure:





Desktop Maintenance

Laptop Maintenace

Fig. 2.2.12: Desktop and laptop maintenance

Desktop Maintenance

The desktop maintenance includes removal of dust and debris from the hardware units of the desktop. The desktop maintenance includes the following steps:

Cleaning of case

Dust or wipe the case with a soft cloth. Clear all obstructions from ventilation ports. Clean the internal parts of a computer or the optical and floppy drives with compressed air. Take care not to blow dust into the interior of a computer. All cables must be firmly attached to their respective connectors on the case.

Maintaining a mechanical mouse

To clean a non-optical mouse, unscrew the ring and remove the ball. Clean the accumulated dirt from the plastic rollers that are set 90 degrees apart inside the housing of the ball.

Keeping a neat keyboard

The best way to clean the crumbs from between the keys of a keyboard is by turning it upside down and shaking it. If that is not enough, use compressed air. If the keys are stuck, pry them off for easier cleaning.

• Cleaning of monitor

Use a soft cloth to wipe the monitor case. Take care to clear any obstructions out of the vents. Use a glass cleaner and a lint-free cloth to clean the screen as the underlying glass is fragile. Clear any magnetic interference.

• Check power protection

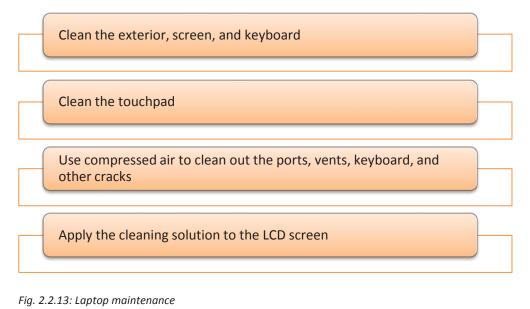
Check that the cables are plugged properly into the surge protector. Ensure that the unit's warning indicator is functioning.

• Swipe CD and DVD media

Use a soft and moist cloth to wipe each disc. While cleaning move outward towards the edge starting from the centre. Ensure that the disc is not wiped in a circular motion.

Laptop Maintenance

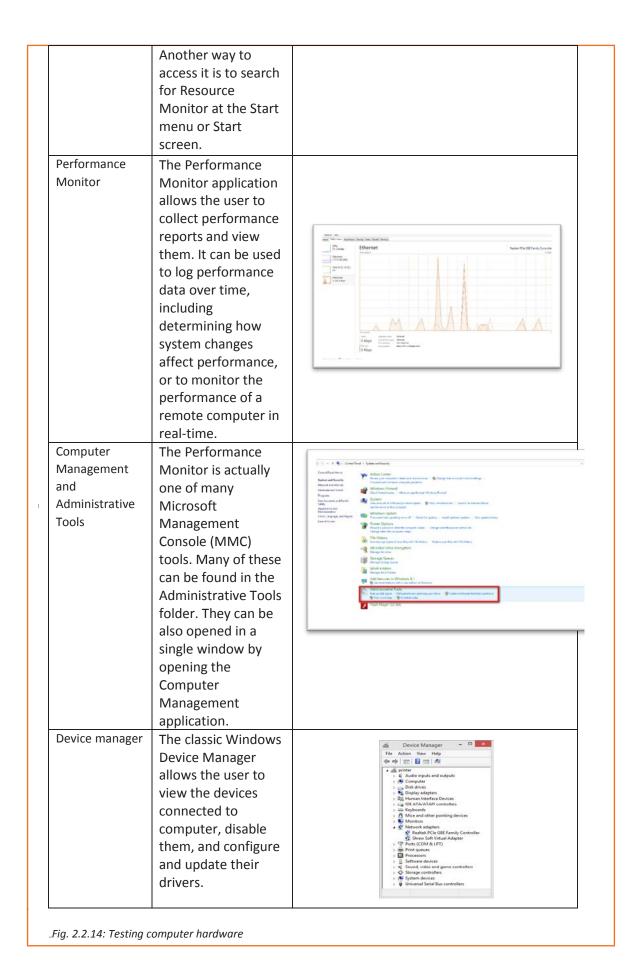
It is important to perform periodic preventive maintenance of a laptop to ensure that it runs efficiently. The first step is to clean the laptop chassis regularly. The performance of a laptop can be enhanced by keeping the components tight and secure, periodically assessing the battery, and keeping the operating system and hard drive clean. The following figure shows the steps involved in cleaning a laptop:



2.2.5 Testing of Computer Hardware

Computer hardware components need to be tested on a regular interval to check whether they need maintenance or repair. The following table lists some testing and monitoring tools in-built in the operating system:

Tool	Function	Screenshot
Windows Memory Diagnostic	It can restart the computer and check the memory of the system for defects.	(P) Pause (X) Exit (T) Run standard tests i Hindous Monory Diagnostic lest nane: MAIS* (cache disabled) Pass: 1 lest: 7 of 11 leaded description identifies nost hasic faults using walking ones nano description in dentifies nost hasic faults using walking ones nano description in dentifies nost hasic faults using walking ones nano description in dentifies nost hasic faults using walking ones nano description in dentifies nost hasic faults using walking ones nano description in dentifies nano description in dentification in denti
Resource Monitor	It offers a comprehensive look at usage of resources in a computer. It enables the user to see the per-process statistics for resources such as CPU, disk, network, and memory graphics. The user can view processes that are heavily using the disk or network, or are interfacing with Internet addresses and so on. To launch the Resource Monitor, click the Performance tab on the Task Manager and select Resource Monitor.	Statution Stat



-2.2.6 Assembling and Disassembling a Desktop and Laptop

The desktop or laptop need to be disassembled and assembled if the components inside a laptop or a desktop need to be repaired or cleaned.

Assembling and Disassembling a Desktop

The steps to assemble and disassemble a desktop are shown in the following figure:

Assembling

Before starting, make sure to have enough screws and a screwdriver

Start with mounting the processor on the processor socket of the motherboard. The special ZIF (zero insertion force) sockets are used to prevent any damage to the processor pins

Attach the heat sink on top of the processor

Attach the CPU fan on top of the heat sink

Fix the motherboard vertically in the tower case and screw it from behind

Line up the power supply at the top back end of the cabinet and screw it. Connect the power connectors for motherboard power supply and CPU fan power supply.

Install the CD/DVD drives at the top front end of the cabinet. Install the Hard disk drive and floppy disk drive below CD/DVD drive and screw it. Make sure that there is no vibration in either the CD/DVD, Hard disk or Floppy disk drives

Select the appropriate data cable and connect one end of the cable to its drive socket and another end at connector on the motherboard

Mount the RAM on its socket on the motherboard and press it downward. Make sure the side tabs are fixed into the RAM notch

Install the internal cards to its socket and attach the cables or power cable to it

Cover the tower by placing it and pressing towards front side and screw it

Connect the external devices with CPU. Connect the mouse and keyboard at PS2 or USB connectors and the monitor at the video output socket. Connect the power cable to the back of tower in SMPS. Plug in the power cable to the electric board

Disassembling

Shut down the system

Remove the power cable from electricity switchboard, then remove the cable from SMPS (switch mode power supply) from the back of the CPU cabinet

Remove the external devices such as keyboard, mouse, monitor, printer or scanner from the back of CPU cabinet

Remove the adapter cards such as video and sound cards. Unscrew the card screw. Grab the card by its front and back edges and gently rock it lengthwise to release it

Pull data cables off from the Hard disk drive, CD/DVD/Blue-ray drives, floppy disk drive as well as motherboard connector

Remove the screws and slide the drive out of the back of the bay

Memory modules are mounted on the motherboard. Handle the chip only by the edges

The power supply is attached into tower cabinet at the top back end of the tower. Detach it from the switchboard

Remove the power connector connected to motherboard, including CPU fan power connector, cabinet fan and the front panel of cabinet power buttons

Remove the screws of SMPS from the back of the cabinet and detach the SMPS from the tower cabinet

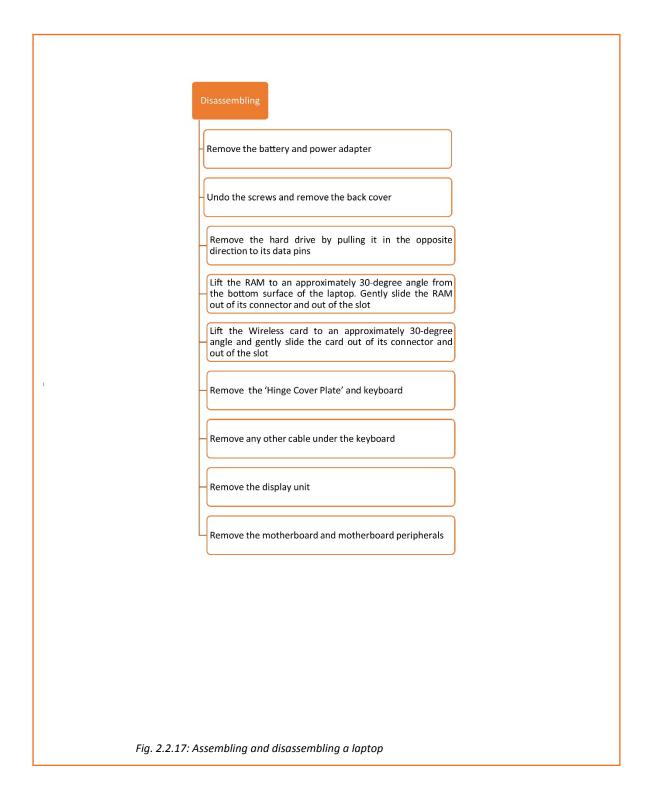
Remove the screws from the back of the motherboard and detach it from the cabinet

Remove the CPU fan from the motherboard. Remove the heat sink by pulling the tab upward

Finally, remove the processor by pulling back the plastic tab and stretching it side ways.

Fig. 2.2.15: Assembling and disassembling a desktop

Assembling and Disassembling a Laptop The steps to assemble and disassemble a laptop are shown in the following figure: Turn over the shell so that the bottom is facing up Remove the panel covering the drive bay Mount the hard drive in the bracket Slide the bracketed hard drive into the bay Install the optical drive Remove the panel covering the motherboard. Insert the SO-DIMM memory chips into their slots at an angle and then push them down to click them into place. The memory sticks can only be installed in one direction Install the CPU Install the cooling fan Insert the battery and charge it.



2.2.7 Upgrading RAM, HDD and Other Parts -

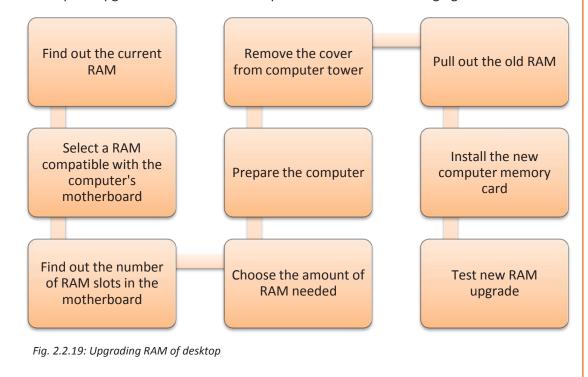
If a system is having problems such as less storage capacity, low RAM speed or slow processor, the hardware components need to be upgraded.

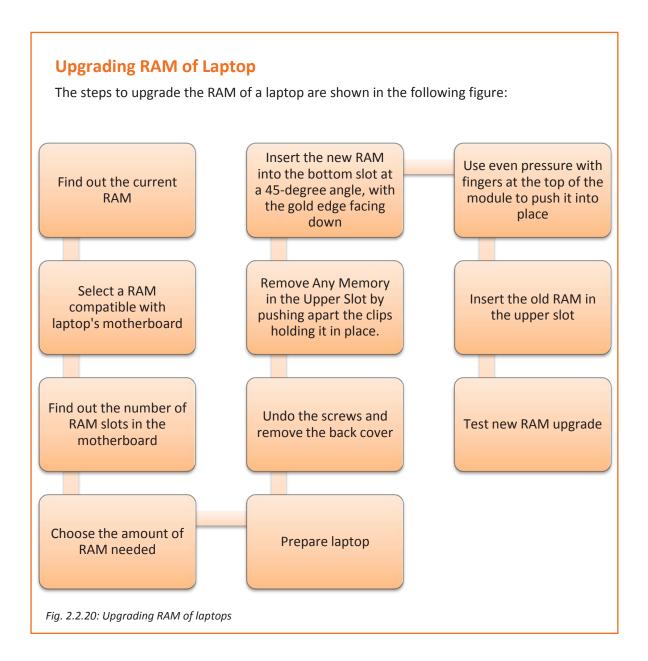


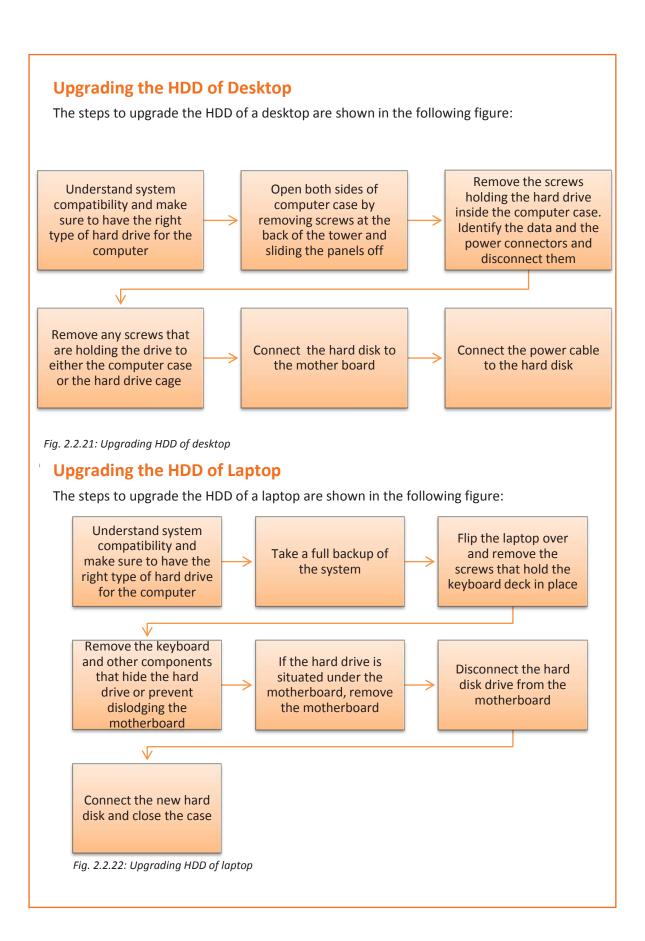
Fig. 2.2.18: Upgrading HDD

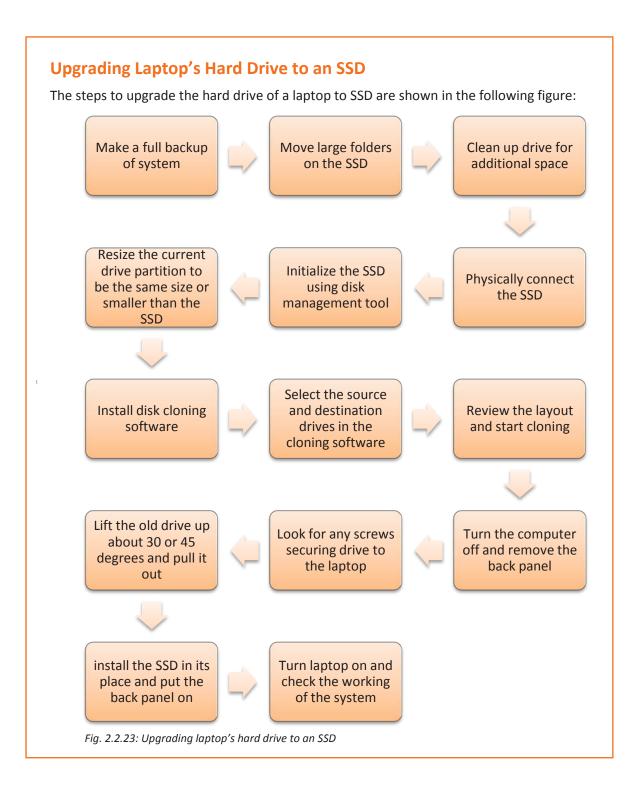
Upgrading RAM of Desktop

The steps to upgrade the RAM of a desktop are shown in the following figure:









Upgrade the Processor of Desktop The steps to upgrade the processor of a desktop are shown in the following figure: Identify motherboard, Unscrew computer's Turn off PC and remove current processor chip, case and remove the RAM memory cards, the power cable cover and video card If current motherboard Choose a motherboard Identify the socket does not support the as per the requirement new processor, buy a motherboard has new motherboard Open the case, unclip Open the lever on the the heatsink off the side of the socket and Push the new CPU in, retaining board and pull gently lift old CPU off lining it up like before the heatsink off the socket Fig. 2.2.24: Upgrading processor of desktop

Upgrade the Processor of Laptop

While it may be possible to upgrade a laptop's processor, it's not recommended for the following reasons:

Replacing the processor will void laptop's warranty

Unless exact pinout of existing CPU is known, an incompatible processor may get installed

The BIOS in laptop may not recognize the new processor and the laptop may never boot. Double check that BIOS will support it.

If the thermal paste is not applied correctly, the new processor may overheat

Unless the processor's heatsink is designed to handle the additional thermal load in laptop, thelaptop may overheat or damage other components such as the LCD screen

If proper ESD handling techniques are not known, it might short out the processor during the installation process

Fig. 2.2.25: Reasons for not upgrading processor of laptop

2.2.8 E-Waste Management

Electronic waste or e-waste refers to the discarded electrical or electronic devices. Used electronics which are destined for reuse, resale, salvage, recycling, or disposal are also considered e-waste. Informal processing of e-waste can lead to adverse human health effects and environmental pollution.

Electronic scrap components, such as CPUs, contain potentially harmful components, such as lead, cadmium, beryllium, or brominated flame retardants. Recycling and disposal of e-waste may involve significant risk to workers and communities. Great care must be taken to avoid unsafe exposure in recycling operations and leaking of materials, such as heavy metals from landfills and incinerator ashes.

The following figure shows a recycle bin filled with e-waste:



Fig. 2.2.26: Recycle bin filled with old "e-waste" of out dated computers, cell phones and related items

The different methods used in E-Waste Management of computer hardware are as follows:

Consumer recycling

Consumer recycling options consist of selling or donating computers to organizations in need, sending devices back to their original manufacturers or giving components to a recycler or refurbisher.

Scrapping recycling

The rising price of precious metals coupled with the high rate of unemployment has led to a larger number of amateur electronics recyclers. Computer parts are stripped of their most valuable components and sold for scrap. Metals such as copper, aluminium, lead, gold and palladium are recovered from computers.

Corporate recycling

Businesses seeking a cost-effective way to recycle large amounts of computer equipment responsibly face a more complicated process.

They have the options of selling or contacting the Original Equipment Manufacturers (OEMs) and arranging recycling options.

Some companies pick up unwanted equipment from businesses, wipe the data clean from the systems, and provide an estimate of the product's remaining value. For unwanted items that still have value, these firms buy the excess IT hardware and sell refurbished products to those seeking more affordable options than buying new. Companies that specialize in data protection and green disposal processes dispose off both data and used equipment, while employing strict procedures to help improve the environment.

Sale

Online auctions are an alternative for consumers willing to resell for less cash. Online classified ads can be risky due to forgery scams and uncertainty.

Take back

When researching computer companies before a computer purchase, consumers can find out if they offer recycling services. Most major computer manufacturers offer some form of recycling. At the user's request, they may mail in their old computers or arrange for pickup from the manufacturer.

Exchange

Manufacturers often offer a free replacement service when purchasing a new PC. Dell Computers and Apple Inc. take back old products when one buys a new one. Both refurbish and resell their own computers with a one-year warranty.

Donations/Nonprofits

With the constant rising costs due to inflation, many families or schools do not have the sufficient funds available for computers. Old computers can be donated to such families or schools.

Junkyard computing

The term junkyard computing is an expression for using old or inferior hardware to fulfill computational tasks. It utilizes abstraction of computational resources via software, allowing hardware replacement at very low effort.

2.2.9 Configuring wireless Internet in a Laptop

The following equipment is needed to set up a wireless network:

• Broadband Internet connection and modem

A broadband Internet connection is a high-speed Internet connection. Digital Subscriber Line (DSL) and cable are two of the most common types of broadband connections. An Internet service provider (ISP) needs to be contacted to get a broadband connection. Typically, ISPs that provide DSL are telephone companies and ISPs that provide cable are cable TV companies. ISPs offer broadband modems or a combination modem/wireless routers. These can also be found at computer or electronics stores and online.

• Wireless router

A router sends information between a network and the Internet. With a wireless router, a Pc can be connected to the network using radio signals instead of wires. There are several different kinds of wireless network technologies, which include 802.11a, 802.11b, 802.11g, 802.11n, and 802.11ac.

• Wireless network adapter

A wireless network adapter is a device that connects PC to a wireless network. To connect a portable or desktop PC to wireless network, the PC must have a wireless network adapter. Most laptops and tablets and some desktop PCs come with a wireless network adapter already installed.

To connect a PC to wireless network, the following steps need to be taken:

- 1. Select the Network option in the notification area.
- 2. Choose the network, and select Connect.
- 3. Type the security key also called the password.
- 4. Follow additional instructions if there are any.

Activity 🙀



Match the followings.

- 1. E-waste Management a. Hardware testing

- 2. Resource Monitor
- b. Surge Control
- 3. Hardware Maintenance
- c. Corporate Recycling

4. Task Scheduler

d. System Scan

5. Antivirus e. Administrative Tool

Activity: Roleplay



You are a service engineer. A user has asked you how a computer can be kept healthy for a long time. Suggest and advise the user the steps to follow for this.

Activity 🙀

Perform the task of regular maintenance of:

- a. Laser printer
- b. Inkjet printer

Components:

- 1. Laser and Inkjet printer
- 2. Service manual
- 3. Print rollers
- 4. Denatured alcohol or soft toothbrush
- 5. Printing papers
- 6. Cartridge
- 7. Printer ribbon

Activity 🙀



- Perform all the tasks which should be done under:
 - 1. Weekly Computer Maintenance
 - 2. Monthly Computer Maintenance





Perform the task of system restore on windows 7 system?

Components:

Windows 7 system.





Perform the task of system restore from the boot menu.

Components:

System with windows OS









3. Manage Hardware at Customer Facility

Unit 3.1 – Maintaining Hardware/Software at Customer's Facility

Unit 3.2 – Managing Assets and Warranty

Unit 3.3 – Monitoring the System

Unit 3.4 – Maintaining Schedules and Records



Key Learning Outcomes



At the end of this module, you will be able to:

- 1. Identify the work processes at customer's facility
- 2. Manage and resolve issues at the facility
- 3. Explain the importance of managing assets and warranty
- 4. Identify the tools to monitor the system
- 5. Describe the maintenance schedules and records

UNIT 3.1: Maintaining Hardware/Software at Customer's Facility

Unit Objectives



At the end of this unit, you will be able to:

- 1. Identify the work processes at customer's facility
- 2. Troubleshoot issues
- 3. Perform fault tolerance and fault handling
- 4. Resolve general hardware issues
- 5. Manage issues beyond the scope of a service engineer

3.1.1 Work Processes -

Within an organization, customers' issues are reported to the IT service engineer either through an email or through a telephone call. These issues are logged into the system by the service engineer or by the reporting person. Depending on the severity of the issue, the issues are resolved by the service engineer.

There may be cases where the issues cannot be resolved remotely and need the service engineer to visit the customer's facility for resolution. When service engineers visit a customer's facility, then there are certain work processes that they need to follow.

There are some common work processes at the customer's facility that a service engineer to adhere to. The following figure lists these work processes:

Read and understand the service request to know the problem of the customer.

Be aware of the policy and restrictions to be followed at the customer's facility.

Seek details of the problem/issue.

Understand the configuration of different systems, architecture and layout.

Check for the IT hardwares such as storage, network devices, computers and server systems.

Resolve the issue by replacing the faulty module. If any external support is required, contact the appropriate person.

Fill the required documents such as service bill, service report, log book and so on.

Take feedback from the customer in the organization's feedback form.

Fig. 3.1.1: Common work processes at the customer's facility

3.1.2 Assess Applications and Equipment in Use

The service engineer should be aware of the types of applications that run on the systems of customers and the importance of these applications to the customer. Furthermore, service engineers also need to be aware of the critical hardware used at the customer's facility. Typically, server systems and network configurations are the most critical equipment and hardware in any organisation.

To analyse and identify the critical applications and hardware at customer's site, the service engineer should follow some key points, as shown in the following figure:

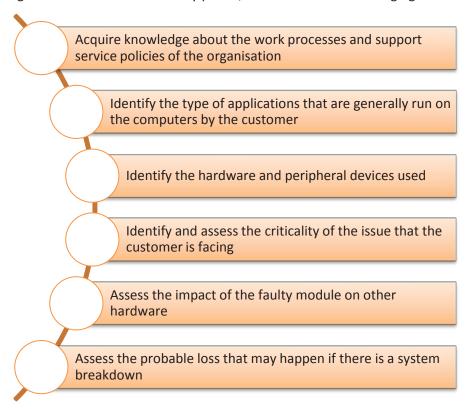


Fig. 3.1.2: Key points for assessing critical issues

Also, service engineers should check the call log database to be aware of similar problems faced by other customers. This helps in faster resolution of issues and thus saves time and effort. Therefore, it is imperative that based on the log database, the service engineer stock the replacement spares for regularly occurring problems.

For example, a customer reports that the printer is not printing anything on the paper. The customer has also tried switching the printer on/off and unplugging the printer. The service engineer has tried to resolve the issue remotely by suggesting the customer to check the print queue. But the problem is not resolved. The print queue shows that the file is printing, but the paper is blank.

Now, the service engineer would typically check the log database and from there come to know that the primary issue in such cases is that the ink cartridge is empty and the printer driver is not able to identify this problem. Therefore, when service engineer visits the

customer site to resolve this issue, it is ideal for them to carry new cartridges for the printer along with the invoice. Since this is a very common problem and the possible resolution is to replace the cartridges with new ones, therefore the service engineer should keep the spare ready and take them along for site visit.

3.1.3 Troubleshooting

Service engineers need to identify whether the root cause of the problem lies in hardware or software. Hence, they need to troubleshoot the related components to look into the details of the problem.

For example, the client's printer is not working properly. To resolve the problem, the service engineer should check:

- Whether there is problem in connection
- Or in the printer
- Or in the driver installation

In addition, a service engineer should be aware of fault tolerance and fault handling techniques. Fault tolerance means the ability of a system to continue working in the event of a fault that may be due to hardware or software. It becomes easy to troubleshoot a device when the system is equipped with these techniques.

Fault handling means that once the fault has been identified, the service engineer should be aware of all possible causes and their corresponding resolutions.

The overall action plan for handling software faults is shown in the following figure:

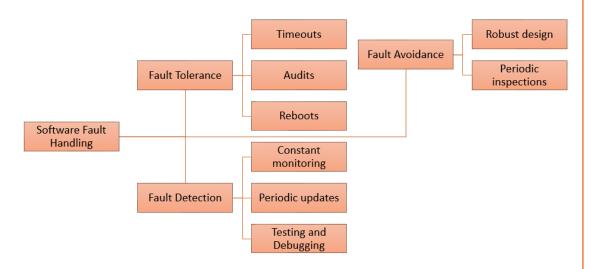


Fig. 3.1.3: Action plan for handling software faults

The overall action plan for handling hardware faults is shown in the following figure:

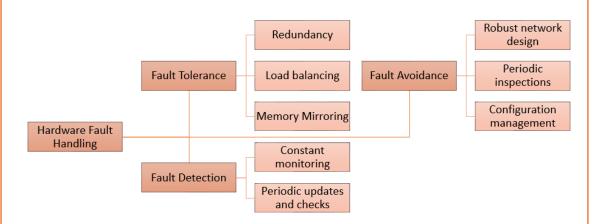


Fig. 3.1.4: Action plan for handling hardware faults

Software Fault Tolerance

Software fault tolerance refers to the ability of a software to continue operation even if there are system or hardware faults present in the system. It provides the software the ability to detect a fault occurring, or have already occurred, and recover from it.

Software fault tolerance techniques can be used to lessen the impact of software faults. The objective of these techniques is to nullify the damage that is caused by software faults.

A service engineer should be aware of these techniques so that it becomes easy for him/her to troubleshoot issues at the customer's facility. The following figure lists some techniques of software fault tolerance which a service engineer should know:



Fig. 3.1.5: Software fault tolerance techniques

Timeouts

Timeout is used by most of the realtime systems that process data which comes in without any buffering. A timeout signals that some components which are involved in the process have faulted and a fix is required. There are two possible actions for this process, Retry or Abort.

The following figure shows how Retry and Abort work: Retry **Abort** Sends the message again by This leads to abort the feature reinvoking the same feature. when timeout is reached. If an application level message is When the system is clogged up resent and it is unable to reach as a result of errors, Abort is the the feature as the system is safest and simplest option in under reboot., Timeout will recovering and clearing the Retry sending the message till errors. the system gets rebooted. Fig. 3.1.6: How Retry and Abort work The Timeout messages vary from one platform to another. The following figures show typical timeout messages on different platforms: C:\Windows\system32\ping.exe 408 Request Time-out Pinging 10.3.3.169 with 32 bytes of data: Request timed out. Request timed out. Request timed out. Request timed out. The request timed out. Fig. 3.1.7: Timeout messages on different platforms

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Whether a request should be cancelled or retried depends on several factors. The following figure lists few of these factors:

How important is system stability	When system stability is important, the Retry option should be used.	
	For example, one should not abort a system startup feature on a single timeout.	
How important is system performance	When system performance is the main concern, starting and stopping of operations frequently may lower system perfromance.	
	So, aborting the feature is better option on timeout the feature.	
Implementation of complexity level	of complexity the whole design may go beyond debugging because of the code	

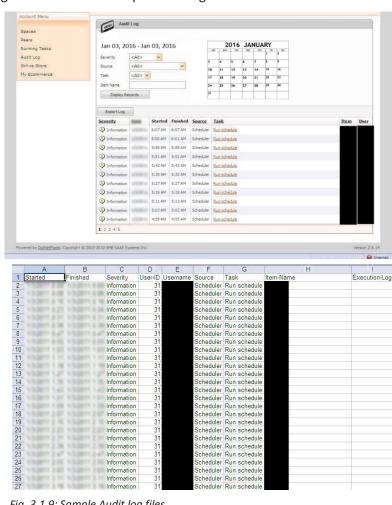
Fig. 3.1.8: Factors for choosing Retry or Cancel

Most of the times the two options, Retry and Cancel, are used together. If no response is recived after retrying a feature certain number of times then the feature might be aborted.

Audits

Audit is a method of checking the consistency of data structures across multiple processors in a system.

Service engineers should be able to read the audit log files. These files are output of the Audit programs that are defined in a system. For example an Enterprise Resource Planning (ERP) system has more than one layer and contain multiple processors. Hence, any break in signals because of hardware failures, software bugs, protocol failures, or any independent processor reboot may lead to data inconsistency.



The following figures show some sample audit log files:

Fig. 3.1.9: Sample Audit log files

Incremental Reboot

Rebooting the software processors repeatedly is time consuming. To save time, as well as work disruptions, real-time systems use incremental reboot procedures. The following figure shows the system reboot levels:

First Level Reboot Operating system reboot only Second Level Reboot Operating system reboot + configuration data download Third Level Reboot Program reload + operating system reboot + confguration data download

Fig. 3.1.10: System reboot levels

Generally, first level reboot reolves the issue. However, sometimes, the processor keeps first level rebooting of the system. This results overflowing of the first level reboot counter, which in turn leads to second level reboot.

Typically, second level reboot resolves the issue. In case, even the second level reboot is unable to resolve the issue, then the processor keeps second level rebooting of the system. This results overflowing of the second level reboot counter, which in turn leads to third level reboot.

Hardware Fault Tolerance Techniques

Hardware fault tolerance provides a real-time system the ability to run even when there is hardware failure. Critical systems, such as servers, should have this arrangement incorporated to nullify loss. The techniques used to incorporate hardware fault tolerance are Redundancy, Load Balancing and Memeory Mirroring.

Redundancy

Real-time systems are installed with redundant hardware so that whenever a fault takes place, they takeover and thus prevent downtime and loss. Some methods of hardware redundancy are:

- One for One redundancy Each hardware module contains a redundant module,
 Passive module. The primary module (Active) and the secondary module (Passive,
 redundant module) are exact replica of each other. The Passive module monitors the
 Active one and takes over if there is an Active module failure. The probability of failing
 of both the modules at the same time is very low.
- N+X Redundancy Similar to the One for One Redundancy method, this method uses a specific number (say, X) of Passive modules for N number of Active modules. Moreover, there is also a main hardware module which monitors and tracks the Active N modules. This main module decides which Passive module will take over in case an Active module fails.

Load Balancing

In ideal conditions, the hardware modules share the load. There is a top-level module, the main module, which evenly distributes the load and maintains health status of hardware modules simultaneously.

If any hardware module fails, the main module enables distribution of load among the rest of the modules. This setup makes a compromise with the system performance but ensures availability of system at all times.

The following figure shows a typical load balancing system:

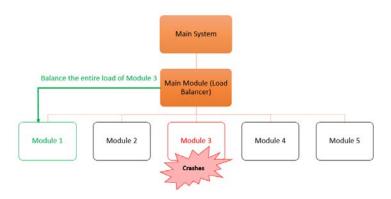


Fig. 3.1.11: A typical load balancing system

Memory Mirroring

In this technique, the system setup contains of two parity based memory and two CPUs – one active and one passive.

The passive CPU does not have any memory and the active CPU keeps writing on both the memories. Passive CPU monitors the active CPU continuously. If a fault is detected, it takes over. When the memory is read, both memory are compared. If there is any mismatch, processor considers the output of the correct memory and tag the other one as faulty.

3.1.4 Fault Detection

If a fault detection mechanism is developed in a system, then timely fault detection and its immediate isolation from the entire system to a safe unit is important.

Some commonly used fault detection techniques are:

Sanity Monitoring

- •In this technique, the monitoring module recives regular health messages about the module which is being monitored.
- •In case as series of health messages (predefined) are not recieved by the monitoring module, then a fault is reported by the monitoring module about the monitored module.

Watchdog Monitoring

- •This technique is used for modules that hangs or stops operating.
- •The monitored module has a attached hardware timer (the watchdog), which never allows Timeout.
- •Typically, this timer is programmed to restart periodically.
- •When the monitored module hangs or, in case of an appication, is not responding, the watchdog raises an alarm.
- •The module is then reset and a signal is send to the main unit.

Protocol Faults

- •This technique is not a preferred one.
- •In this technique, if any one unit in a network fails, then the entire network has protocol faults.
- •Then, the faulty unit has to be discovered and secluded from the rest of the untis.

In-service diagnostics

- •This technique performs simple checks to diagnose faults of working modules.
- •These checks ensure that they do not disrupt the routine functioning of the hardware modules.

Fig. 3.1.12: Commonly used fault detection techniques

Hardware diagnostics is used to check the health of the system and is run on most computers. This is also used to detect faults on normal operational computers. The following figure shows different types of tests for running hardware diagnostics:

Power On Self Tests (POST) Out of Service Tests (OST) In-Service Monitoring

Fig. 3.1.13: Different hardware diagnostics steps

3.1.5 Fault Avoidance

Fault avoidance is a process oriented approach to avoiding faults or failures in the applications or software of the system.

The whole aim of enabling fault avoidance in a system is to ensure that, at any given time, the system or its modules do not fail. However, remember that a system cannot survive with only fault avoidance in place—fault tolerance and detection must be there in the system as well.

Fault avoidance best works for simple systems (not for complex systems as they are always vulnerable to threats) and it works well when applied with fault tolerance mechanisms.

So before suggesting fault avoidance techniques to a customer, a service engineer needs to be well aware of the type of system and how fault avoidance may prove beneficial for the customer's system.

3.1.6 Fault Handling Mechanism

The following figure shows the mechanism of fault handling by an active unit in a redundancy pair:

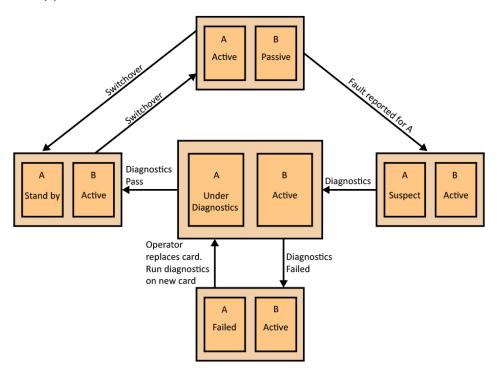


Fig. 3.1.14: Mechanism of Fault Handling

The system consists of A as an active unit and B as the standby unit. When A fails, B detects the fault using the techniques and becomes active. The state of A is marked as suspect, pending diagnostics. Then, the system informs the operator about the current non-redundant configuration of the system. Diagnostics scheduled on A include power-on diagnostics and hardware interface diagnostics.

If the diagnostics on A pass, it is tagged as standby unit. If the diagnostics fail, it is marked as failed and the operator is informed about the failed card. The operator replaces the failed card with new one. Then, the system checks the new card to find if the new card is healthy.

A start monitoring B which is currently active. The system then restoes the redundancy and marks the non-redundant configuration alarm as cleared. Ones the redundancy has been restored, the operator switches the two copies and restores the original configuration.

Handling Processor Reboot

A real-time system contains multiple processors which are meant to perform different roles. Each processor is vulnerable to both hardware failure and software failure leading to reboot. Hence, these systems are incorporated with the mechanism to handle processor reboot to ensure smooth functioning.



The figure lists the steps to be followed for processor failure and recovery handling: *Fig. 3.1.15: Steps to handle processor failure*

Processor Failure Detection

When a node or processor fails, the failure is detected by other processors or nodes present in the system in any one of the following ways:

Loss of periodic health messages is way to detect process failure in a system having very low traffic.

In a busy system, protocol faults help to detect failure of a processor. The fault handling software detects the processor failure as soon as the node sends a message to it.

Cleaning up on the Processor

When a node (processor) fails in the system, other nodes (processors) are made to clean up the impact of the failure of the node. It is the system's (the central processor's) responsibility to track and notify other nodes about a node failure. However, this notification and cleaning up process results in an increase in processor utilization and memory buffer.

Processor Recovery

After the failed node has recovered and is active, it notifies the system, which in turn notifies the status to all the other nodes. This enables the other nodes to re-store the original protocol with the recovered node.

Data Reconciliation

Immediately after the failed node has recovered and is active, it has to re-establish and reconcile the data that may have been lost during the failure.

The following figure shows data reconciliation techniques:

Restore the configuration data from other nodes in function.

Take periodic backup of data to prevent data loss and enable faster data recovery.

Restore data structures by reconciling them with other nodes.

Fig. 3.1.16: Data reconciliation mechanism

Audits

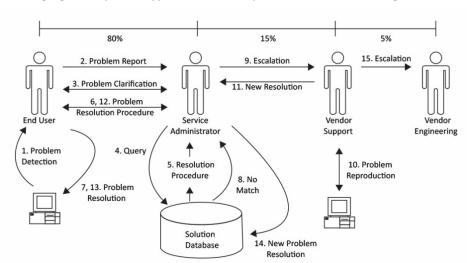
After the failed node has recovered and is active, to analyse the result and consequences of the processor failure, software audits are conducted to correct inconsistencies in the system. After the fixes have been done to correct inconsistencies, the audits should be run regularly to ensure proper functioning of the system.

Handling Issues Not within Scope

In an organization, each problem of the software or hardware system cannot be resolved by an IT service engineer. Some of the typical examples of such cases are:

- Some systems, such as ERP or data management systems, where lot of customization
 has been done for the client by the service provider or the implementation partner.
 This customization is like a black box for an IT service engineer. This is because its
 code/program may not be shared. Also, there might be a separate team to support
 these systems.
- There are some hardware servers or systems which are under control and support of an external vendor. Thus, the service engineer may not have any role to play in this scenario.

In both scenarios, one may take external support or escalate the issue. However, if it is not sure under whose preview the issue lies, a senior person should be consulted before approaching the problem.



The following figure depicts a typical escalation process for a service engineer:

Fig. 3.1.17: Escalation process for a service engineer

Escalate Problems to the Vendor

Software developers write code to meet client's requirement in such a way that only they can understand the system's behavior. So it is difficult to troubleshoot such a system and also time consuming. It is always recommended to take external support of the developer to solve such issues.

Escalate Problems to a Senior

If the service engineer is not aware of the developer of a particular system, then it becomes difficult to contact and resolve the issue. In most of the organizations, there is a list of all software and systems that are being used. This list also contains a point of contact for each software or system. To refer to this list, a senior person should be consulted.

Activity 🙀

You have gone to a customer site to solve an issue with a faulty computer that on start up is repeatedly giving out four beeps at very short intervals and nothing appears on the screen. However, the fan running sound is there.

Component:

- 1. Screw driver set repair toolkit
- 2. Spare RAM, Processor and Motherboard
- 3. ESD wrist band
- 4. A computer system with a faulty motherboard

Activity 🙀



You have received a customer complaint that their computer loses its time and date settings on every restart. You have called the customer and after fixing a time to visit, now have gone to the customer's facility to fix the issue. How will you fix this issue?

Component:

- 1. Screw driver set repair toolkit
- 2. Spare CMOS battery compatible to the system
- 3. ESD wrist band
- 4. A computer system with a faulty CMOS battery.

UNIT 3.2: Managing Assets and Warranty

Unit Objectives



At the end of this unit, you will be able to:

- 10. Identify various assets in the organization
- 11. Recognize the requirement of asset management
- 12. Explain IT asset management methodology

When the service engineer is working at the customer's organisation he/she should know about the system configuration, hardware and software used at the facility. An asset is anything in the organization that is valuable and needs protection. The following figure shows the various assets in an IT organization that need to be tracked:

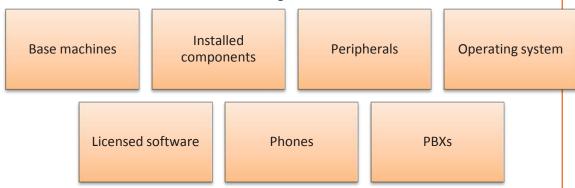


Fig. 3.2.1: Various assets in an IT organization



Private Branch Exchange or PBX refers to a personal telephone line of an organization. In order to make phone calls to people outside the organization's PBX, employees need to go through the exchange operators.

3.2.1 Requirement for Asset Management

A service manager should be able to manage assets to achieve complete visibility on the IT infrastructure inventory. This asset details help the customer organization to improve efficiency and performance, and minimize overhead expenses that are related to the assets.

The major goal of asset management is to set up a centralized repository that stores the existence and purchase of all the hardware and software. One of the major reason for keeping the software licenses updated and completely managed is to ensure that there is no illegal software installation practiced in the organization. In case there is any noncompliance to this policy for no illegal software implementation, then it should be immediately reported to the concerned authority. The following figure shows the requirement for asset management in an IT organization: To keep details on the hardware in use and take relevant stock of those To record and manage the date of purchase, warranty details and maintenance schedule for all hardware and software To assess the condition of assets and their maintenance To maintain a database and monitor it To control cost of software license by reducing the probability of overbuying or incurring fines on non-licensed software To create and enforce technology standards by setting standard asset requests Fig. 3.2.2: Requirement for asset management The following figure lists the information about systems and components that are required for managing assets: What systems and equipment exist Where components reside How they are used What they cost When they were added to inventory Whether they have an expiry date How they impact IT and business services

Fig. 3.2.3: Information needed for managing assets

Also, it is important to ensure that the assets of the customer are secured and as a service engineer at the customer's facility, one is needed to ensure that nothing bad, like a theft or system crash, happens at the customer site.

The following figure lists some major security process to ensure safety of the asset during asset management:

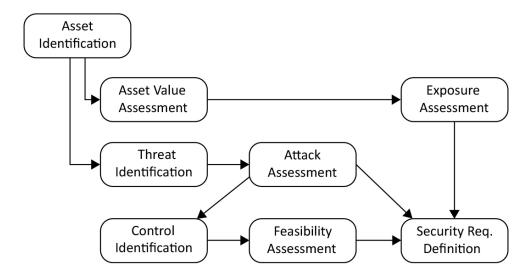


Fig. 3.2.4: Major security process to ensure safety of the asset during asset management

3.2.2 IT Asset Management Methodology

A service engineer should be able to understand the asset management methodology and follow the steps of it. The following figure shows the asset management methodology:

- •Discover hardware and software components
- •Capture and store the type of asset, make,

Asset discovery, data capture and storage

Asset tracking

- •Identify and track change in the number of assets, location of assets
- Capture data about the asset from purchase to expiry and decommissioning

Asset lifecycle management

Asset reporting and alerting

- •Generate asset inventory report
- Receive alerts on the warranty and expiration of lease contract

Fig. 3.2.5: Asset management methodology

An IT service engineer should be able to:

- Read the product label that contains serial number and product id
- Assess the age of the assets and their condition so that maintenance schedule can be made based on criticality and redundancy of the assets according to the contract with the customer.
- Keep records of all the details of the assets. The following image shows a snapshot of asset management database:

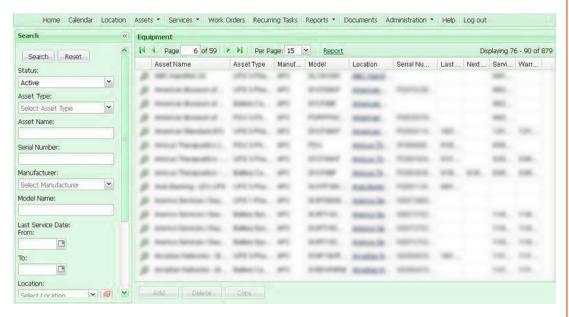


Fig. 3.2.6: Snapshot of asset management database report

- Update the database of the assets which are not in use or issued to customer or returned by the customer
- Understand the policy and work process of the customer organization

3.2.3 Reading Serial Number and Product Id

The service engineer should have the knowledge of the product labelling of any software or hardware component. Serial number and product id uniquely identify the component. The format of serial number varies with type of product and its manufacturers. The series of letters and numbers in serial number may specify the manufacturer information, country of origin, year of production and number of unit. The following image shows serial number of a product:



Fig. 3.2.7: Serial number of a product

The following figure lists some examples of serial number and product id of different products:



Fig. 3.2.8: Serial number and product id of different products

The service engineer should be able to find the product identification label for different product. For a notebook, the identification label may be in different location as shown in the following figure:



Fig. 3.2.9: Identification label at different location

Software serial numbers, also known as product keys, are included on the CD with its packaging.

3.2.4 Contract and Company Policy of the Customer

A service engineer should be able to understand the contract agreement with customer organization to have knowledge about customer requirements, issues, service period and so on. The service engineer should also be aware of the restrictions imposed by the customer when working at the facility.

He/she should be aware of the different IPR issues that may have to be faced while working at the facility. For example, the service engineer may not have the access to all the data residing in the system or he may not have the permission to use any external storage device if it is not registered in the organization.



To safeguard the unique material, such as content, trademarks, copyright, patents, and industrial design rights, created by people, Intellectual Property Rights (IPRs) are granted to the material.

Reading Warranty of Vendors and Company

A service engineer should know the terms and conditions of buying a product and should be able to read and understand the warranty provided. The service engineer should search for information such as:

- Tenure of the warranty
- Time of beginning and expiring
- The conditions that may void the coverage
- The contact details to get warranty service
- What the company will do if the product fails—replace the product or refund the cost
- Parts and issues covered
- Coverage of consequential damage
- Conditions or limitations of the warranty (some warranties provide coverage only if you maintain or use the product as directed)

The service engineer should be able to make the customer understand about the warranty details.

Activity 🙀



A customer has recently purchased a new hard disk for their computer since the old one had crashed. Perform a task of installation of new hard disk to the computer.

Component:

Hardware:

- 1. Phillips and flat blade screwdrivers (small and medium size)
- 2. A 3-claw part grabber
- 3. A chip inserter and chip extractor
- 4. A TORX head screwdriver
- 5. A 1/4" and 3/16" nut driver
- 6. A container to hold small parts and screws

Software:

- 1. Operating system
- 2. Bootable disk with FDISK.EXE and FORMAT.COM copied onto disk
- 3. Disk Manager

Activity 🙀



There is an apparent failure of the motherboard or a system device on the motherboard at customer's facility. Troubleshoot the issue.

Component:

- 1. Screw drive set repair toolkit
- 2. Spare Motherboard as per the system compatibility
- 3. ESD wrist band



Perform the task of Installation of Network Interface card.

UNIT 3.3: Monitoring the System

Unit Objectives



At the end of this unit, you will be able to:

- 1. Explain the causes of low performance of the system
- 2. Identify different monitoring tools
- 3. Evaluate the monitoring reports

3.3.1 Need for Monitoring a System -

IT service engineers should monitor the customer's system at their facility for assessing different components and establishing maintenance schedules. They should be aware of the changes in technology of products so that they can upgrade and update the product checking its compatibility with the other components of the system.

There are different causes behind degradation of any system. The service engineer should be able to identify the right cause for the problem after monitoring the system. For example, the following figure lists some of the causes of degradation of a system:

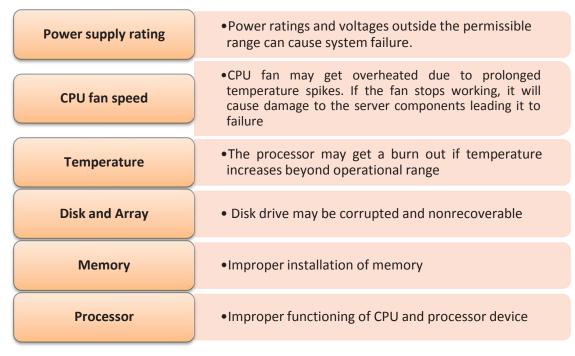


Fig. 3.3.1: Different causes of low performance of a system

The service engineer should be able to:

- Monitor the voltage and power readings of system components to be sure that they
 are within safe operating limit.
- Monitor the server's CPU and system board temperatures to track the functioning of the modules within the safety range.

- Detect and rectify the faulty configuration or improper installation of the memory.
- Monitor and track details for both physical and logical disks to ensure there are no disk failures. Also, ensure that recovery files for file systems are updated and maintained.
- View details of CPU configuration.
- Ensure proper functioning of CPUs by monitoring the status of processor devices.
- Monitor network performance for smooth workflow.

Computers have devices such as heat sinks and fans inside them to bring the temperature of hardware components down as much as possible. Otherwise, system may stop working due to excessive heat generation. Sometimes the processor, graphics card, and even a hard drive may get hotter because of inefficient cooling and building up of dust or due to a faulty fan.

Most of the components inside a modern computer include monitoring sensors that can notify about temperatures, power draw, about fan speeds. The service engineer should be able to find the values on systems from BIOS. But it is not preferable to sit all day to monitor those values. The service engineer should use some utility software and monitoring tools for this purpose. For this he/she should do the following as shown in the figure:



Fig. 3.3.2: Steps for monitoring a system

He/she should search for the new version of the applications used on the system and update them as per company policy.

3.3.2 Monitoring Tools

A typical monitor tool is used by a system administrator to monitor data and create periodic logs for:

- Analysing the recurring issues in the system
- Solving recurring problems
- Observing the network's response to logged events
- Analysing future behaviour of the system based on the current scenario/data

There are some in-built tools in a system that can be used for monitoring. Service engineers should have the knowledge about the functions of these tools and how to run them. These tools are:

• Performance Monitor

- Resource Monitor
- Device Manager
- Computer Management and Administrative Tools
- Task Scheduler
- Disk Clean-up

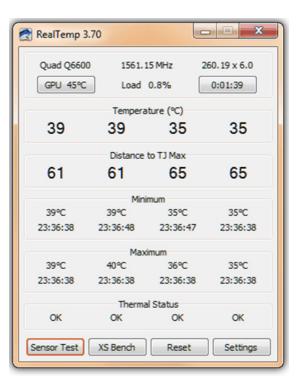
The following figure lists some other monitoring tools and software available over the Internet:



Fig. 3.3.3: Various monitoring tools and software

Assess the Monitoring Report

The service engineer should be able to assess the report of monitoring software and take steps to rectify the faults. The following image shows snapshots of the reports:



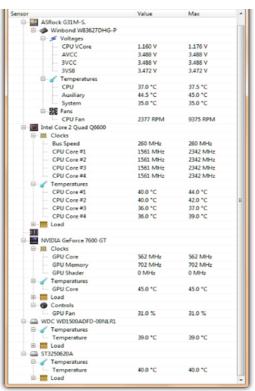


Fig. 3.3.4: Snapshots of monitoring reports

Source:https://www.raymond.cc/blog/monitor-hardware-health-temperatures-voltages-and-fan-speed/

It is important to generate and deliver reports for showing the status of the system to non-technical people, in a clear format. These reports need to be forwarded to specific people in the organization to whom the information is relevant.

The service engineer should save and analyse historic data not only to know what is happening in real time but also to use the reports for making better decisions for the same issue in future.

The service engineer should keep track of the temperature and dust environment required for managing the assets. He/she should be able to manage security of the system by installing security tools. He/she should also be able to define the access controls for securing the systems and the user accounts. The service engineer should keep track of the number of changing passwords of the system.

Activity



Perform the task of error identification from the device manager as part of routine maintenance.

Components:

1. System.

Activity

Perform the task of testing of memory on maintenance basis?

Component:

1. A computer system with operating system installed.

UNIT 3.4: Maintaining Schedules and Records

Unit Objectives



At the end of this unit, you will be able to:

- 1. Explain maintenance schedules
- 2. Recognize importance of schedules and records

3.4.1 Maintenance Schedule

Maintenance schedule is vital for keeping records of servicing, repairing and performing preventive maintenance. The service engineer should maintain service records and next servicing schedules to be inform the customer about the maintenance of the components at the facility. The service engineer needs to perform hardware and software maintenance.

The following image shows a sample maintenance schedule report:

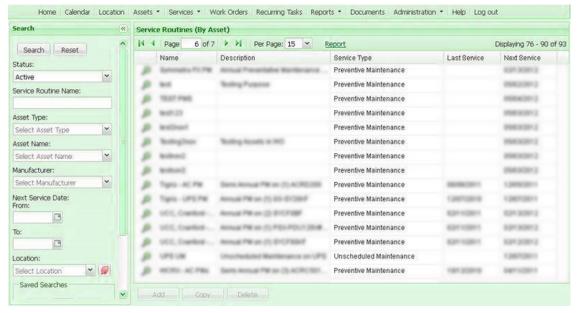


Fig. 3.4.1: Sample maintenance schedule report

Software Maintenance

A service engineer needs to update the software version. He/she should record the expiry date of software and after expiry date install new one with proper licence agreement.

Hardware Maintenance

The service engineer should assess the condition of hardware components and upgrade the if required. He/she should be aware of the compatibility issue. The service engineer also need to maintain the warranty details of the components. If the warranty period is going to expire, he/she should communicate that with the customer and ask for any extended warranty he needs.

In this case, there are two ways:

- The customer can ask for extending the warranty period.
- The customer doesn't want to extend it. If there is any problem, he will buy a new one.

The service engineer need to communicate about the above two ways and then tell the details of further procedure.

The following image shows a sample maintenance requirement form:

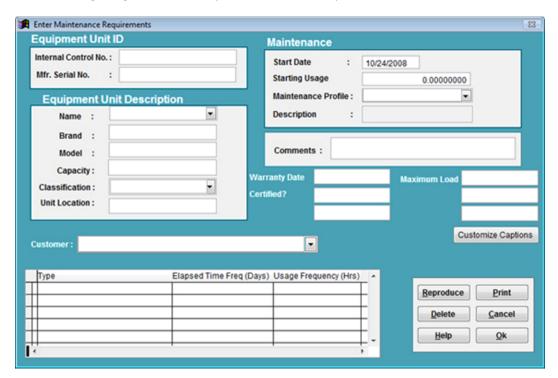


Fig. 3.4.2: Sample maintenance requirement form

The service engineer should maintain a checklist for scheduling the maintenance. The following figure shows a maintenance checklist:

Activity	Frequency	Auto?
Check power supply fan for ventilation and dirt build-up and clean if necessary	Quarterly	No
Back up CMOS information	Quarterly	No
Check processor temperature, inspect heat sink and fan to ensure they are working	Annually or Whenever case is open	No
Check hard disk for temperature and vibration	Annually (or whenever case is opened)	No
Clean exterior of case	Annually	No
Clean exterior of monitor	Annually	No
Check and clean interior, motherboard and expansion cards if necessary	Annually	No
Check internal connections and cables	Annually	No

Fig. 3.4.3: Maintenance checklist











4. Manage Customer's System Remotely

Unit 4.1 – Monitoring Systems Remotely

Unit 4.2 – Reporting Performance

Unit 4.3 – Interacting with Customer, Vendor and Superior

Unit 4.4 – Achieving Delivery Standards



Key Learning Outcomes

At the end of this module, you will be able to:

- 1. Define remote monitoring and management (RMM)
- 2. Explain incident management
- 3. Use statistical tools for monitoring
- 4. Achieve downtime of less than 1% or as contracted
- 5. Escalate problems
- 6. Maintain records of activity

UNIT 4.1: Monitoring Systems Remotely

Unit Objectives



At the end of this unit, you will be able to:

- 1. Define remote monitoring and management (RMM)
- 2. Describe the remote monitoring system process flow

4.1.1 What is Remote Monitoring and Management (RMM)?

RMM is an assembly of information technology tools that should be installed at servers and client systems. These tools gather information related to the applications and hardware operating at the location of the client and provides activity reports to the IT service provider, enabling them to resolve an issue. RMM generally offers a collection of IT management tools such as remote desktop monitoring and support, trouble ticket tracking, and user information by means of a complete interface. The following figure shows a process of support service being provided remotely:



Fig. 4.1.1: Support service network

With the help of RMM, network and computer health can be proactively remote tracked. RMM helps to increase the overall performance of the existing technical support staff and take advantage of available resources efficiently.

Advantages of RMM

- IT service providers employ remote monitoring and management tools to manage their clients' IT requirements effectively.
- Using RMM, technical support staff can enhance productivity by monitoring multiple clients and different workstations simultaneously.

- They can also resolve issues quickly even before the clients confront those in their environment. The RMM solution also enables automation of scheduled maintenance tasks.
- The RMM can detect problems, report to the service providers about them, and allows technical experts to remotely fix the problems.
- Additionally, RMM solutions provide highly effective management and maintenance functions. Active maintenance comprises of managing OS updates, defragmenting the hard disks, updating antivirus information and so on.

Network Diagram of Remote Monitoring IT Hardware Systems

An IT hardware service engineer needs to have complete knowledge of how to remotely monitor, manage and troubleshoot hardware as well as related software through RMM. A network diagram of remote monitoring IT hardware systems is shown in the following figure:

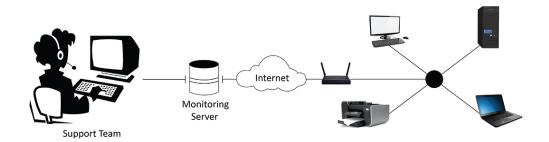


Fig. 4.1.2: Network diagram of remote monitoring IT hardware systems

The IT Hardware support team has access to a monitoring server. When a customer contacts IT support team, the service engineer requests the customer to provide basic details of the customer's computer like IP address, user name and password and then accesses the computer remotely via Internet. With the help of RMM tools, the technician troubleshoots and resolves the issues in the customer's computer remotely. If the issue is not resolved remotely, the service engineer plans a visit to the customer's site for further assistance.

Features of RMM:

Some prominent features of RMM are:

- Updating of software's remotely: Install new or update existing software remotely (including patches, version updates and configuration changes).
- Detecting devices remotely: Detect new devices and automatically, install the RMM agent/client and configure the device.
- Performance observation: Observe the behaviour of the managed device and software for performance and diagnostic tasks.
- Automatic fault escalation: Automatically alert when fault occurs and create a report document for future reference.

4.1.2 Workflow for Monitoring Systems Remotely

The following figure shows workflow for monitoring systems remotely:

Link the Use monitoring Take remote Identify monitoring system to Configure connection problem tools to regional hub systems to monitor areas in real monitor as and develop manually or systems time and contracted or refine automatically troubleshoot remotely monitoring tools

Fig. 4.1.3: Process flow of remote monitoring systems

Taking Remote Connection

To monitor a system remotely, an Internet connection with TCP/IP is needed. Generally, IP address of the system to be controlled and the administrative credentials for accessing that system should be known.



There should be a dedicated lease line to monitor a system as there are always chances that a dial-up connection may be disruptive

To be able to see the customer's system and then monitor it remotely, the service engineer needs to install software like TeamViewer. Using such remote administering software, the service engineer can perform the tasks shown in the following figure:

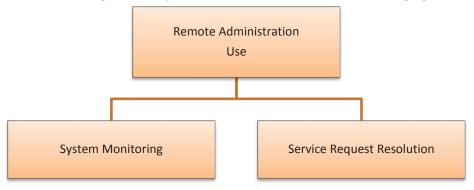


Fig. 4.1.4: Remote administration

System Monitoring

Service engineers need monitoring systems, or tools, to track and monitor performance of system resources such as monitoring CPU usage and temperature, amount of free RAM, amount of free space on hard drives and so on.

System Monitoring can be done by using any of the following methods:

- 1. **Single System Monitoring** In this method, native monitoring tools are used to monitor a host system remotely. Some of these tools include:
 - i. **Activity Monitor** It is a system monitor for the Mac OS. It also includes task manager functionality.
 - ii. **Windows Performance Monitor** It is used to monitor a system using performance counters, event trace data, and configuration information. These can be collectively viewed as Data Collector Sets.
 - iii. **Resource Monitor** It is an inbuilt tool in Windows for viewing information related to devices, such as CPU, memory, disk, network and applications. A snapshot of this tool is shown in the following figure:

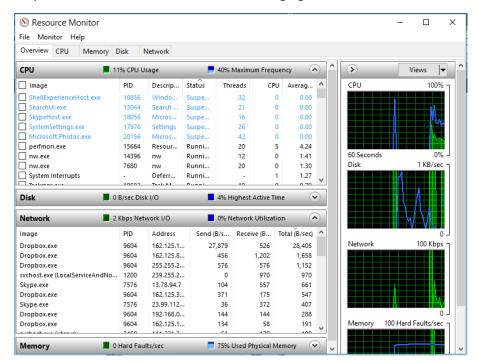


Fig. 4.1.5: Snapshot of resource monitor

This tool includes the following five options:

- Overview Shows an overall performance of the CPU, Network and other related information
- CPU Lists Processes, Services, Associated Handles and Modules, graphs of CPU Usage
- Memory Shows overall Physical Memory consumption and individual Process consumption, graphs for Used Physical Memory, Commit Charge and Hard Faults/sec
- Disk Shows Processes related to Disk Activity, Disk Activity and Storage, graphs of Disk Usage (KB/sec) and Length of Disk Queue

- Network Shows Processes related to Network Activity, TCP Connections and Listening Ports, graphs of Network Usage for individual adapters and TCP Connections
- 2. **Distributed System Monitoring** In this method, distributed systems are monitored by collecting and interpreting information related to simultaneous process execution. Typically, this method is used in organizations with several systems connected to a central server. Some tools used for distributed system monitoring are:
 - i. Argus This tool, an application, is used to monitor the status of network services, servers, and other network components. It raises an alarm to send notifications to configured authorities when an issue is detected.
 - ii. Nagios This application is also used to monitor network and its systems. However, this tool raises an alarm to send notifications to configured authorities when an issue is detected in the servers, switches, network applications, or services. It also notifies when the issue has been successfully resolved.
 - iii. **HP Site Scope** This software focusses on the accessibility and performance of IT infrastructures, such as servers, networking devices and services, applications and their components, operating systems and other components in a network.

Techniques for Monitoring Data in a Network

Other than using the common monitoring tools, service engineers will often need to use other techniques to check remotely the services and availability of servers for the customer's system. Some common techniques used for monitoring data in a network are:

- 1. **Ping** Used to test the availability of a system (can be a server) in an IP network. The information displayed using a ping can help a service engineer analyse whether a system in the network is active or not. In addition, ping can find out the transmission time for data and packet loss, if any, when communicating with that system.
- 2. **Simple Network Management Protocol (SNMP)** Used for interchanging information between systems in a network which have network monitoring software. This is a common protocol used in distributed systems for their network management and monitoring. This protocol includes the following components:
 - Managed device: It is the node that supports SNMP and can access specific network information.
 - Agent: It is a software which has access to the management information database (MIB) of the device and permits network management systems (NMS) to read and write to the MIB.
 - NMS: It is an application that monitors and controls managed devices in a network through the agent using SNMP commands.
- 3. **Syslog** It is a logging system which enables devices to send event messages or notifications using IP addresses in a network. These messages can be used by the

system/network administrator to extract relevant information or for security audits. Printers, router, and firewalls are some of the devices that support the Syslog utility.

- 4. **Command Line** It is used to run commands remotely using the customer's system's command line interface.
- 5. **Process Manager** It is used to monitor and manage (start, pause or end) processes of a system remotely.
- 6. **Power Shell** It is used to remotely run power shell scripts using the command line console.
- 7. **Service Manager** It is used to remotely monitor and manage services on systems.
- 8. Leveraging the Power of Scripts It is used to run scripts containing common network utility commands, such as ping and netstat. The scripts are usually used to perform actions such as retrieving information for devices, changing device configurations or scheduling tasks. Some common scripting tools are Bash scripts and Perl.

4.1.3 Using Monitoring Tools -

The network consisting of servers, computer systems and other devices has become the lifeline of organizations. Therefore, it is important that all the systems are functioning fine and giving optimum resource utilization to the organization.

Service engineers need to ensure that the IT infrastructure of the organization is constantly monitored and managed. Some advantages of regular monitoring of systems remotely are:

- Proper and optimum utilization of all hardware resource
- Issue avoidance and timely problem detection
- Detection of potential problems
- Decrease in system downtime and cost in fixing systems resulting in higher customer satisfaction

To monitor systems remotely and view the desktops of other remote systems, several monitoring tools are available. The following figure displays a typical scenario for monitoring remote systems and providing support to customers:



Fig. 4.1.6: A typical scenario for monitoring remote systems and providing support to customers

Monitoring Tools with Real-Time Data

Some common tools used for monitoring real-time data remotely in a network are:

 Hardware Sensors Monitor – This software is a paid software and provides HDD SMART (Self-Monitoring Analysis and Reporting Technology) and GPU or CPU monitoring. It is used to check motherboard, graphics card, HDD, and CPU temperatures, speed of fans and level of voltages.

The following figure shows the Hardware Sensors Monitor window:

(The following screenshot has been taken from the "Tools to Monitor Your System Hardware", Web. https://www.raymond.cc/blog/monitor-hardware-health-temperatures-voltages-and-fan-speed/)

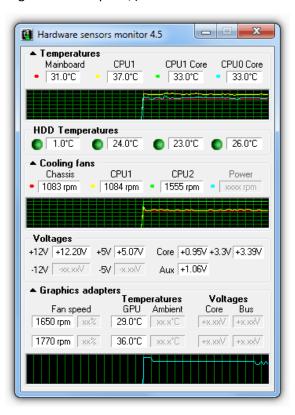


Fig. 4.1.7: Screen shot of Hardware Sensor monitor in real time

2. **HW Monitor** – This tool is used to remotely view system temperature, fan speed and voltage. It shows three values; current values, minimum and maximum values, since the program has started.

The following figure shows the HW Monitor window:

(The following screenshot has been taken from the "Tools to Monitor Your System Hardware", Web. https://www.raymond.cc/blog/monitor-hardware-health-temperatures-voltages-and-fan-speed/)

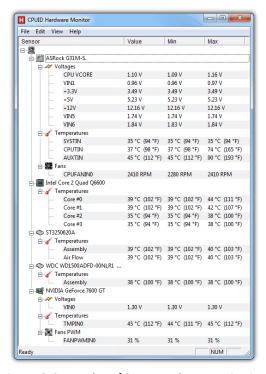


Fig. 4.1.8: Screen shot of CPUID Hardware monitor in real time

3. **Open Hardware Monitor** – This tool does all that the HW Monitor can do plus it shows the detailed frequencies and load of CPU or GPU, memory information, storage space of hard drive and remaining life and data throughput of a Solid-State Drive.

The following figure shows the Open Hardware Monitor window:

(The following screenshot has been taken from the "Tools to Monitor Your System Hardware", Web. https://www.raymond.cc/blog/monitor-hardware-health-temperatures-voltages-and-fan-speed/)

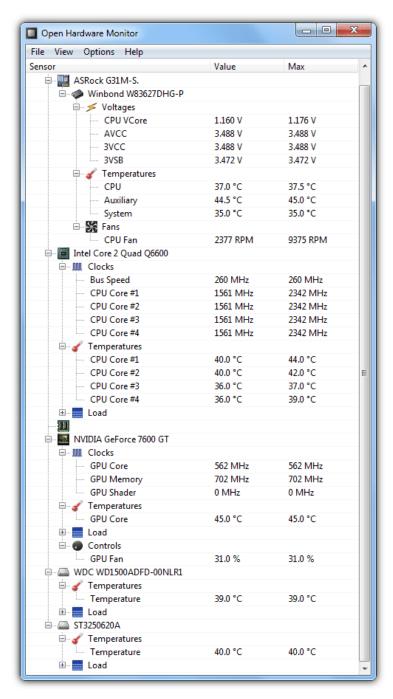


Fig. 4.1.9: Screen shot of Open Hardware monitor in real time

4.1.4 Linking the Monitoring System to Regional Hub

To remotely monitor a computer system or hardware devices, there is a basic network setup required using the Internet. The following figure shows a typical linking of monitoring systems to a regional hub through the Internet:

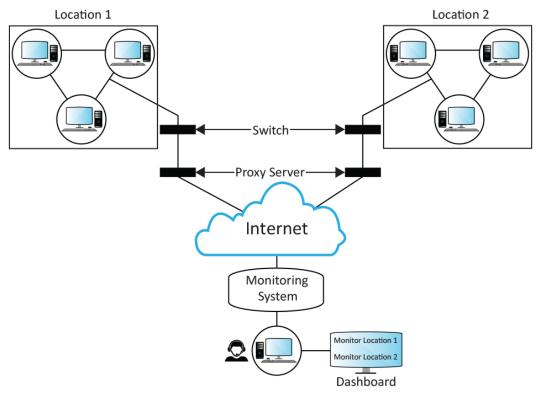


Fig. 4.1.10: Use of tools by IT hardware support technicians

In the preceding figure, there are two different client locations at remote places. The hardware systems and devices such as printer are connected at the locations through Virtual Private Network (VPN). The VPN is connected to a network switch. This switch is used to process and forward data to the monitoring server though the Internet.

The proxy server acts as an intermediate system for requests from the IT support team seeking resources from the monitoring server team. The service engineer, at first connects to the proxy server, then, requests for a service, such as a connection, file, web page or any other resource, that is available on the monitoring server. All the requesting and monitoring is done using an Internet connection which uses IP suites to connect the monitoring system with the VPN at different locations.

The service engineer is connected to remote monitoring system and uses various RMM tools to monitor the hardware at different locations remotely.

4.1.5 Configure Systems Manually or Automatically

A popular use of RMM is to execute some actions daily, automatically or manually, to monitor hardware systems located remotely. To use RMM, there are two modes available automatic dialing and manual dialing.

Automatic Dialing

In automatic dialing, status and configuration information, current data, and error logs of a remotely moniotered system are collectively stored on the RMM system. The RMM tools then check this information and data and automatically notify the service engineer about any potential issue with the remote system.

An example for this can be that the remote system's temperature is detected as much higher than the optimum temperature. The RMM tool will, in this case, automatically alert the engineer along with the criticality of the issue.

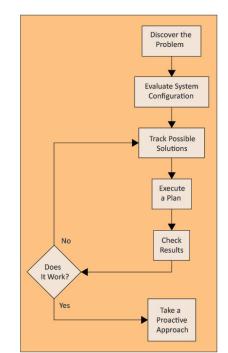
Manual Dialing

Typically in situtations when the RMM is unable to automatically connect with a remote system, the engineer can manually dial-in to the rmeote system. In manual dialing, the engineer can use a variety of functions to collect information/data and modify configuration settings. The engineer can also inspect complaints or reported issues.

An example for this can be that one of the software of the remote system, suppose an antivirus, is out of date, which can be very critical since the customer is mostly browsing the Inernet. In this case, the engineer can manually access the customer's system remotely and then update the software's latest version.

4.1.6 Identify and Troubleshoot Problem Areas in Real-Time

In real time, the service engineer would need to identify and then troubleshoot the problems or issues with the customer's system remotely.



The following figure shows a typical flow for discovering and troubleshooting issues:

Fig. 4.1.11: Work flow for troubleshooting issues remotely

The steps for the preceding workflow are:

- **Identify the problem** The first step is to identify the problem, analyze it and find the possible cause based on the symptoms. The engineer would also need to document the findings.
- Evaluate system configuration The next step is to review the remote system's history and find out the configuration changes, if any, since the system last functioned. Some typical configuration changes may be that a new hardware or software was installed, or an incompatible Windows application is installed.
- **Track possible solutions** Once the symptoms have been identified, and the causes are narrowed down, then comes the step to find possible solutions.
- Execute a plan The next step is to devise a plan in case the possible solutions do not work. This plan will also include taking backups and other such data restorations.
- Check results Once solution has been applied and problem has been fixed, the system needs to be checked again to see if the problem has been fixed as expected and is giving the desired results.
- Take a proactive approach It is always advised to keep documenting your issue, possible causes, possible solutions, the solution that solved the problem, and then the final results. This would help other engineers resolve similar problems quickly.

Activity 🔀



You received a service request that the browser's homepage automatically changes. How would you resolve this problem remotely?

Components:

- 1. System with browser hijacker such as Babylon toolbar, Ask toolbar,
- 2. Remote administration software on client and host machine
- 3. Internet Connection
- 4. Anti-virus installed on host machine

Activity 🙀



You received a service request that the anti-virus on the customer's system does not load or gives an error when it attempts to load.

Component:

- 1. Defected antivirus
- 2. Remote administrator software
- 3. Anti-virus backup
- 4. Internet connected

Activity 🙀



You received a customer message that some applications in the are giving invalid page fault and crashes automatically. How would you resolve this?

Components:

- 1. A system with corrupted application.
- 2. Remote administrator software
- 3. Internet connection

UNIT 4.2: Reporting Problems

Unit Objectives



At the end of this unit, you will be able to:

- 1. Describe problem management
- 2. Use statistical tools to develop intelligence and spot potential areas of disruptions
- 3. Record downtime details

4.2.1 Problem Management

Problem Management is the procedure for dealing with the lifecycle of all issues. It aims to keep issues from recurring or if possible, preventing issues and to limit the effect of occurrences that cannot be predicted. The Information Technology Infrastructure Library (ITIL) characterizes an issue as the reason for at least one issue occurrence.

Problem Management combined with incident management and change management can help organizations maintain service quality and customer satisfaction.

The various aspects of problem management process are listed in the following figure:



Fig. 4.2.1: Various aspects of problem management process

Problem management involves:

- **Problem detection** This step involves detecting an issue or a problem and then analysing that issue to ascertain possible causes and their solutions.
- Problem logging In this step, the engineer needs to log or document the issues along with their reported date and time. Several fields need to be marked for the logged issues such as:
 - Details of service
 - Details of equipment
 - Date/time initially logged
 - Details of priority and categorization
 - Description of incident
- Problem prioritization Based on the severity of the issue, the problems are prioritized. To determine the priority of an issue, the engineer should ask the following questions:
 - Would the system recover from the issue or would it need to be replaced?
 - O What will be the cost of fixing the problem?
 - O Who will be able to fix the issue?
 - O How much time will it take to fix the issue?
 - o Will any other resource be needed to fix the issue?
 - o How does the issue effect other resources/systems?
- Problem investigation and diagnosis This step involves defining and describing the
 problem, identifying the reasons, analyzing the reason for the problem and validating
 the actual reason for the problem.
- **Known error records** After analyzing the problem and its causes, and identifying the possible solution, a Known Error Record is sent to be stored in the database for future reference. This helps in solving similar problems or issues faster in the future.
- **Problem review** After the problem has been solved, it is imperative to review the problem and its resolution by checking the following parameters:
 - O Were the correct steps taken to solve the problem?
 - Were there any additional problems that occurred while solving the major problem?
 - o Is there a need for improvement in the system?
 - o How can such issues be prevented from recurring?
 - Was there a third-party or vendor involved for solving the problem?

While solving problems and finding their resolutions, some key performance indicators are considered. These include:

- **Priority** It is the determining factor calculated using the problem's impact on other systems/resources and its severity.
- **Response Time** This is the time taken by the service engineer to take action on the reported problem.
- **Resolution** The restoration of the normal functioning of the system is the resolution. It may be a work-around temporary resolution till the root cause for the problem is identified.
- **Service Agreement** It is an agreement that lists the services that will be provided by the service engineer (or their organization) and the cost of these services.
- Service Level Agreement (SLA) The SLA is an agreement between a service providing organization and the customer that lists the services which will be provided by the organization and the functional levels at which support will be provided. It also includes the costs for the services. A service agreement is different from an SLA as there are no ongoing service level areas defined in a service agreement.
- Service Level Areas It is a commitment by a service provider that is defined in the SLA. The service level areas are defined as per the service level requirements of the customer. The areas are documented to ensure that the IT services meet the expected service level requirements.
- **Severity** It is defined by the level of disruption that has been caused to the user's work by the problem. There are three levels of severity:
 - o 3 Low Problem prevents the user from performing a portion of their work
 - 2 Medium Problem prevents the user from performing critical time sensitive functions
 - o 1 High Service or major portion of a service is unavailable

4.2.2 Use Statistical tools to Spot Disruptions

Statistical tools are software that empower service help-desk operators monitor customer requests and manage user related issues.

Service help-desk tools that can monitor and manage customer requests have become vastly popular. Service help-desk tools work by automating the following tasks:

- Ticket Management
- Automation Suite
- Reporting and Optimization

Service help-desk tools are popular as they act as a point of contact for the customer, 24 by 7. Customers can send their queries, report issues, and even read FAQs or user manuals for finding faster resolution to common problems.

Service help-desk tools are categorised based on their deployment, size for targeted customers and availability of the source code.

Some popular service help-desk tools' categories are:

- Web
- On-premises
- Enterprise
- Open-source
- Cloud based

Some advantages of using service help-desk tools are:

- Helps in management of complex customer query databases, reports, and SLAs
- Faster resolution of issues for all types and sizes of organizations
- Automation of issue resolution tasks such as ticketing and prioritization, alerting and notifying and issue record updation.
- Helps provide better customer services, thus enabling higher customer satisfaction.

Information Technology Infrastructure Library (ITIL)

ITIL is a set of guidelines which are used to map IT services with the business requirements of customers. ITIL defines various generic processes, functions and responsibilities that can be used by an organization to develop its service delivery strategies and core competency levels. Some areas defined in ITIL are listed in the following figure:

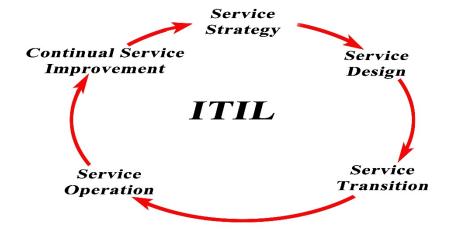


Fig. 4.2.2: Some areas defined in ITIL

ITIL enables organizations to define a standard for planning, executing and measuring service delivery.

Some ITIL based tools used by service help-desk teams are:

- Automatic call distributor (ACD) Diverts customer calls to appropriate team/engineer based on information received from the customer and work load of the team.
- **Computer telephone integration (CTI)** Manages customer calls based on customer's historical data and ensures smooth query handling.
- Global configuration management database (G-CMDB) Standardizes service implementation by globally managing tickets based on the ITIL incidence compliance, problem management and change management.
- Knowledge Database (KDB) Stores common problems, their causes and resolutions

4.2.3 Recording Downtime Details

The time for which a system is unable to function is called downtime. Downtime is the result of a malfunction of a system or an occurrence of an unintended event.

Downtime may be due to failure of regular maintenance of the system or an existence of an undesirable condition, such as voltage surge, virus attack, incompatibility of software and other such reasons.

To manage and ensure that downtime is minimum, service engineers should keep checking the downtime history of the system and all its assets.

Generally, asset downtime is logged in Downtime Reports. The reports typically consist of the following parameters:

- Start Code A code that denotes the cause for the start of the downtime.
- **End Code** A code that denotes the cause for the end of the downtime, or the status update of the system from down to up.
- **Operational** A selection state when the system or asset achieved downtime, referring to the state of the system as in use.
- **Non-operational** A selection state when the system or asset achieved downtime, referring to the state of the system which was not in use.

UNIT 4.3: Interacting with Customers, Vendor and Superior

Unit Objectives



At the end of this unit, you will be able to:

- 1. Prepare action plan and share it with customer and/or vendor
- 2. Interact with senior management of customer
- 3. Recommend new solutions to customer
- 4. Attend customer's IT meetings
- 5. Escalate unresolved issues to superior

4.3.1 Prepare action plan and share with customer and/or vendor

Action plans are a series of steps that are defined and followed to achieve a particular goal or target. Action plans can help IT support technicians to manage and structure the day-to-day interactions with customers. Action plans usually consist of one or more phases, each phase having one or more steps. When a customer service technician uses a best practice methods model to follow through with a client inquiry, it is an example of following an action plan.

For every customer inquiry, a support ticket is generated. This ticket enables the support technician to spot when an issue has reached its critical stage. The plan of action for responding to an issue may vary on the basis of the type of issue. For example, the action plans for updating driver software would be very different from the action plans to tackle the issue of server cooling system going down. Nonetheless, every action plan created should follow some basic guidelines as shown in the following figure:



Fig. 4.3.1: Some basic guidelines for action plan created

Once a critical issue has been triggered, the helpdesk technician can take one of the following two actions:

- Report to the problem management team to resolve the issue by sending an alert
- Inform the customer how to resolve the issue based on past incidents

Consider a scenario where a customer calls the help desk about 25 times, reporting an issue that the server's cooling system is down. From the frequency and the number of calls, along with the issue reported, this would be considered a critical issue that needs immediate action.

After the issue has been resolved, the help desk professional needs to close the loop by updating the customer complaint database with details of the issue such as:

- o Time of starting of the issue
- Time when it was resolved
- Cause of the issue
- o Actions to be taken to avoid it in future
- o Chances of related issues in the short-term future?

This procedure ensures two things. Firstly, the customer gets regular update on the status of issue and secondly, the support agents get a hint about the issues that may be experienced in near future.

The action plan for critical issues should be created keeping in mind the company values and customer expectations. As per the company's policies, the system engineer needs to take a call whether to immediately respond to a critical issue reported or whether to devise a suitable resolution before taking any action.

4.3.2 Interact with senior management of customer

The help desk professional represents the IT staff of the organization. The customers often judge the entire organization on the basis of their interactions with a help desk professional.

It is, therefore, essential for help desk technicians to recognize their roles within the organization as well as in relation to clients. Help desk technicians also require to possess a strong set of soft skills along with strong technical skills.

First Line of Support for Users

The help desk is the first point of support for users whenever a problem is confronted by them. If the help desk is able to resolve the problem, customer is satisfied. In case, help desk professionals cannot resolve the problem completely, they need to offer assistance in a way that it leaves a favourable impression about the organization on the customer. The help desk personnel require strong communication skills and they need to recognize the customer service goals of the organization.

Evaluate Problems and Identify Solutions

The main reason for a customer for contacting the help desk is to get solution to a problem they are facing. Help desk specialists must have technical knowledge and should be able to assess the problem and identify the solution.

However, for help desk technicians, troubleshooting the problems of the customers goes beyond the technical skills. They also require having good communication skills to understand the customer's problem and communicate the solution.

Recognize Required Skill Sets

A successful help desk technician requires a wide range of skill sets, categorized as hard skills and soft skills. A combination of good hard and soft skills aid the technician become a good service engineer and a lack of both or either can hamper his performance considerably

Hard Skills

Hard skills are some specific abilities which can be measured and taught such as configuring and troubleshooting systems. For example, someone might enrol in a hardware maintenance course and then pass the qualifying exam to earn certification in hardware maintenance. The certification signifies that the person has specific skills related to IT maintenance. The following figure shows some of the common hard skills that are required by help desk technicians:

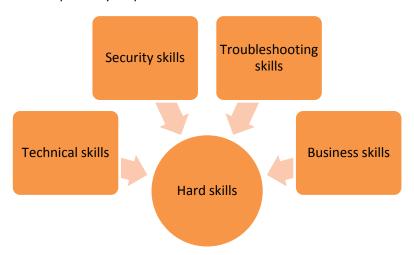


Fig. 4.3.2: Common hard skills needed by help desk technicians

Technical skills

Technical skills refer to the ability of a technician to configure IT systems, maintain them, and troubleshoot the problems. These skills may vary organization to organization, department to department within an organization as well as between different levels in a particular department. For example, a technician working at tier 1 must have deep knowledge of the products and systems operated by the end users. As one moves up the hierarchy to tier 2, additional knowledge, skills and expertise is required.

Security skills

Security skills refer to the ability of the technician to recognize the relationship between various vulnerabilities, threats, and risks. For example, technicians must be able to recognize the symptoms of malware and resolve them. Additionally, they should be able to understand the security policies of the organization and ready to comply with them.

Troubleshooting skills

Troubleshooting skills deals with the technician's ability to identify and fix a problem. Generally, the highest tier in majority of the organizations is tier 3 and technicians at this level troubleshoot and fix the problems that are the most complex ones. However, tier 1 technicians must be able to perform basic troubleshooting steps to minimize the problem.

Business skills

Business skills involves the understanding of the technician of the vision, mission, values and goals of an organization. The technicians must have the capability to use various tools such as help desk applications. They should be able to insert customer information into specific help desk application and use the information to search for previously occurred problems so that they can fix the customer's issues quickly.

Soft Skills

Soft skills are more subjective than the hard ones. Soft skills are associated with personal attributes and involves the ability to communicate with others effectively. They represent how successfully individuals can work in a team together with other people and how effectively they can interact with users. The following figure shows some of the common soft skills that are required for help desk technicians:



Fig. 4.3.3: Common soft skills needed by help desk technicians

- **Communication skills:** Communicating effectively is of utmost importance in IT support job roles. Technicians must be able to ask the user to acquire adequate information about a problem without having on a tone of interrogation. Two important skills required for effective communication are:
 - Using open-ended questions
 - Active listening
- **Personal skills:** Personal skills deals with the ability of a person to manage himself in different situations. Core personal skills comprise of the ability to:
 - Maintain a positive attitude
 - o Evoke a service attitude towards the customer
 - Manage personal time
 - Handle stress
 - Manage one's career
- Writing skills: Written communication is one of the most important soft skills for help
 desk technicians. Majority of the organizations maintain a knowledge base of
 complaints of customers and their solutions. Technicians utilize the database for
 searching for common problems and their solutions. For this database to be helpful,
 the technicians should document their actions after resolving an issue, in a clear,
 concise and comprehensive manner. This makes it vital for help desk technicians to
 have strong writing skills.
- Training skills: In many cases, the service engineer guides or trains the customers on simple resolutions to common problems that a customer may come across. This helps the customer to quickly solve simple issues on their own. In most organizations, when a new application or software is implemented into the system, there is a formal training for all employees who would be using that application/software. This training is typically provided by senior service engineers.
- **Critical Thinking:** Critical thinking skills make a lot of difference in job performance. Critical thinking involves the activities as shown in the following figure:



4.3.3 Recommend New Solutions to Customer

Many organizations use flow charts with pre-illustrated procedures that technicians can utilize to identify problems. Figure 4.3.5 illustrates a flow chart that can be utilized when a complain comes telling that the "computer has broken." The technician should ask simple questions such as "Can you see anything displayed on the screen?", "Can you see the power LED of the monitor?", and "Is the computer LED to you?" Based on the responses to these simple questions, the technician can either ask more questions to be clear about the issue or follow a predefined procedure to fix the problem. A simple flow chart, such as given in the following figure, helps technicians resolve these problems quickly.

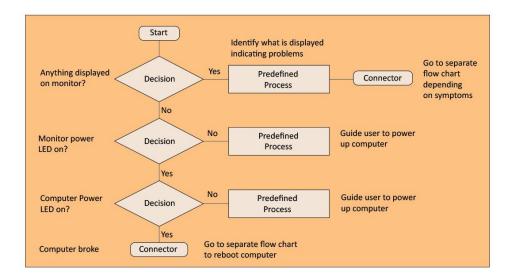


Fig. 4.3.5: Flow chart for support process flow

But, what happens when either the flow charts are not available or the problem is not simple? In such situations, critical thinking skills play a vital role. Complex problems display numerous symptoms and the technicians need to assess each of them and distinguish the relevant symptoms from the non-relevant one. They should then draw on their experience to troubleshoot and resolve such complex problems. In other words, critical thinking skills enable them to analyse a problem and compare it to past ones they have experienced.

4.3.4 Attend customer's IT meetings -

An important element of customer service is building good relationships with customers. A happy customer is a loyal customer who will always come back. The only way to offer good customer service is to recognize the requirements and expectations of the customers.

To be able to meet customer's expectation, the IT technician needs to follow the steps as shown in the given figure:

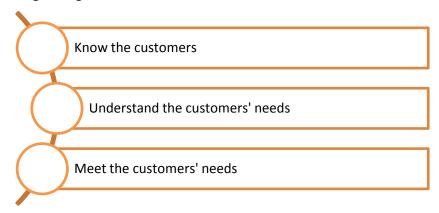


Fig. 4.3.6: Steps to meet customer's expectation

Know the customers

The first step is to collect information about the customers. The idea is to find out about the customers' needs and what they are looking for as per the IT support. When trying to understand their needs, try to know details such as their location, IT hardware equipment and their configuration. Try also to consider any potential customers who have enquired about the service.

Understand the customers' needs

Every customer has different expectation from customer service. The second step of good customer service is to have knowledge of how to fulfil the needs of the customer.

Make it a point to understand how the customers expect the help desk to meet their needs. The expectations of the type of service may vary from consumer to consumer, marketplace to marketplace and industry to industry. Try to investigate the marketplace to find out what the customer expects from the organization.

Meet the customers' needs

After taking care of the first two steps, the next thing is to modify the level of service to suit the customers' needs. There can be two ways of meeting customer's needs:

- Provide a basic level of service
- Go beyond the expectation of the customer and leave a good impact on the customers

Some ways to go beyond the expectations of customer are:

- Introducing initiatives which send a clear message to customers that their inputs are valuable and desired. Examples of such initiatives can be customer survey cards, customer focus groups, or a suggestion box
- Suggesting add-ons

Some actions that can be taken to upgrade customer service are:

- Investigating the areas of issue
- Providing training to the staff in customer service and sales skills
- Offering job rotation to the staff so that they can enhance their knowledge of other areas
- Encouraging and supporting teamwork
- Reviewing recruitment and selection procedures

4.3.5 Escalate unresolved issues to superior

There may be cases where the customer's request is not closed within the agreed SLA time frame. In such a situation, the technician should escalate the matter to his superior/back line support and the escalation manager. The supervisor is responsible for ensuring that all escalated enquiries are dealt with and resolved promptly. However, the technician should try to exhaust all the options at his level before escalating any enquiry to the supervisor.

A customer enquiry should reach the supervisor only if there is a need to oversee the issue from a holistic viewpoint. The manager will evaluate the situation, facilitate the issue resolution and act as an advocate on behalf of the customer.

Complaints escalation process

The helpdesk technician should do everything to fix an issue at first instance. To facilitate efficient resolution of the problems at the first point of contact, a complaint process needs to be designed and followed.

If an issue is unresolved and needs expert guidance, the helpdesk technician should clearly explain the escalation options to the customer before proceeding. The following figure illustrates the steps of a complaint resolution process:



Fig. 4.3.7: A complaint resolution process

Step 1: First contact

A helpdesk technician needs to be empowered to resolve first level complaints, complex issues and make rational decisions to provide better customer service.

Step 2: Escalation to a supervisor or manager

If a helpdesk technician is unable to fix an issue, it can be escalated to the supervisor or manager. The manager will respond to the customer after reviewing the problem and attempt to fix that to achieve customer's satisfaction.

In circumstances where the manager cannot resolve the complaint and achieve customer satisfaction, the complaint will be escalated to the Solutions team.

Step 3: Referred to Solutions team

The Solutions team will review and try to fix the issue in accordance with industry code and regulation and ensure customer satisfaction.

Step 4: Further options

Most of the complaints can be handled internally by utilizing all possible avenues in resolving the complaint. However, if customer is still not satisfied with the handling of the complaint, then as a last resort helpdesk technician may seek complaint mediation or further assistance from the supervisor.

UNIT 4.4: Achieving Required Delivery Standards

Unit Objectives



At the end of this unit, you will be able to:

- 1. Adhere 100% to contracted standards of work
- 2. Achieve downtime of less than 1% or as contracted
- 3. Escalate problems in time and as per criticality of work process
- 4. Maintain 100% records of activity

4.4.1 Adhere 100% to Contracted Standards of Work

A customer service department must own a measurable set of standards so that the helpdesk technicians can be aware of what expected from them. These standards ensure that the customer service and satisfaction is consistently at the highest possible level.

The standards for customer service should also reflect the organizational values. For example, hospitality industry may have different customer service standards in comparison with a corporate service that provides technology tools to a wide range of commercial customers. To make sure that the service levels are consistent throughout the organization, a clear and measurable set of standards need to be designed and followed. The following figure shows the features of customer service standards:

Timeliness Accuracy

Appropriateness Measurability

Fig. 4.4.1: Features of customer service standards

• **Timeliness** – The IT helpdesk technician should aim for a timely resolution of customer issues.

- **Accuracy** Customer service must be accurate. The focus should be on solving the issue with right set of methods and standards.
- **Appropriateness** Appropriateness refers to how effectively the expectations of the customers are met. The helpdesk technician should ensure that the best possible solution is selected to resolve an issue.
- Measurability To be effective, the standards need to be measurable. Along with setting standards, guidelines should also be created to be aware of how to monitor them and evaluate the results. The helpdesk technician should use these guidelines to point out the problem areas and maintain the service standards consistently.

Benefits of Implementing Standards

Once the service standards are defined, they need to be followed by the customer service team. The helpdesk technicians should have a clear understanding of the benefits of following such standards. Some benefits of these standards are as shown in the following figure:



Fig. 4.4.2: Benefits of customer service standards

ISO and The International Customer Service Institute (TICSI) have published the following standards for customer service:

- ISO 9004:2000, on improvement of performance
- ISO 10001:2007, on customer service conduct
- ISO 10002:2004, on quality management in managing complaints of the customer complaints
- ISO 10003:2007, on resolution of disputes
- ISO 10004:2012, on monitoring and measuring
- The International Customer Service Standard (TICSS)

4.4.2 Achieve Downtime of Less Than 1% or as Contracted

Downtime or outage duration refers to the period when a system becomes unavailable and is not able to perform its primary function. When this happens, it raises questions on the availability, reliability and recovery of the system. The unavailability is the proportion of a time-span that a system is not available because of the system failing to function due to an unplanned event, or as a result routine maintenance.

As depicted in the following figure, downtime occurs in two ways:

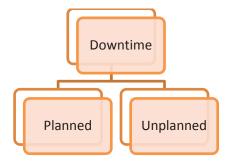


Fig. 4.4.3: Occurrence of downtime

Planned downtime

Planned downtime is the result of scheduled system maintenance work. This includes upgrading a system or replacing aged hardware from time to time, which requires rebooting a machine. Planned and scheduled downtime in service windows has minimal impact but is difficult to avoid.

Unplanned downtime

Unplanned downtime is beyond the control of the organization and is unforeseeable. It, therefore, has more impact on the business. Examples of unplanned downtime are infrastructure failures, human mistakes or even geographical catastrophes.

Steps to Consider to Check Downtime

It is important to minimize the downtime and maintain the service level agreements (SLAs). This can be achieved by designing products and services with service uptime in mind.

The following figure illustrates the steps needed to move towards zero downtime:



Fig. 4.4.4: Steps needed to move towards zero downtime

Step 1: Prevent Hardware Downtime

Just as in building a house, preventing downtime depends on choosing the best foundation for IT. The two most critical components for preventing downtime are right hardware and operating platform. A system should be set up in such a way that it gives consistent performance on a wide range of hardware architectures. This provides extra stability and availability features across different platforms on customer service aspects.

Step 2: Maximize Service Availability

The ultimate goal of a helpdesk technician should be to maximize service and workload availability. The general availability of the system can be improved by introducing redundancy. This can be done by using the concept of open source clustering technologies. Several redundant servers are combined into one cluster, achieving higher availability than is possible with a single server.

Step 3: Minimize Human Mistakes

As per an estimate, about 13 percent of downtime incidents are caused by human mistakes. One of the ways to reduce the risk of error in repetitive or complicated tasks is by using proper tools and automation.

4.4.3 Escalate Problems in Time and as Per Criticality of – Work Process

Escalation is the process of highlighting certain issues within an organization, to make sure that the right personnel can respond to the situations and monitor the fixes. There can be a number of reasons for escalations in support centres. An escalation management system enables an organization to track, monitor and manage situations that need increased awareness and prompt action.

Escalation Management

Escalation management consists of escalation processes that are created carefully to ensure that unresolved issues are addressed promptly. Escalation management includes re-prioritizing, reassigning, and monitoring a situation to an acceptable closure.

As depicted in the following figure, there are two types of escalations:

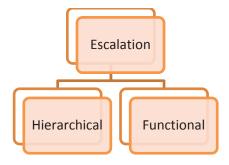


Fig. 4.4.5: Types of escalation

Hierarchical Escalation

It is used to grab the attention of seniors or experts so that they can take the necessary steps to fix an issue. This happens when the first level support cannot resolve the issue. It is escalated to second level support. In case the 2nd level support cannot solve it, they escalate it to the third level and so on until the issue is fixed. The following figure shows hierarchical escalation:

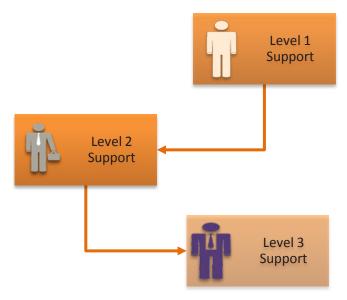


Fig. 4.4.6: Hierarchical escalation

Functional Escalation

It is used in situations when the support team cannot fix the issue within the specified timeline. In such a case, the issue is sent to a different functional department for resolution. The following figure depicts one such case, where different support teams work together to resolve an issue:



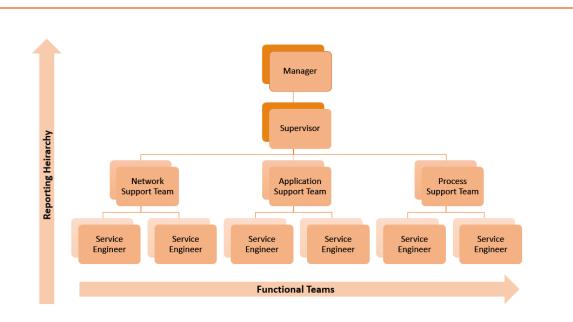


Fig. 4.4.7: A case of functional escalation

Escalation management process is designed to ensure that the targeted time for the resolution of customers' complaints is not exceeded, as such a situation can result in customer dissatisfaction.

The escalation management process may include the following activities:

- Initiate an escalation
- Assign an escalation manager
- Register the escalation
- Assign the escalation team.
- Spot appropriate service providers
- Conduct a detailed appraisal and review of situation
- Perform an escalation management action
- Review the escalation management action plan
- Initiate hierarchical escalation
- Escalation team starts to fix the problem
- Monitor the situation for a specific duration
- Keep standby escalation team in case the problem recurs
- Close the escalation
- Conduct a post escalation review

4.4.4 Maintain 100% Records of Activity

Good customer service also involves maintaining accurate records, managing details of dealings with the customers. Customer records can help in gathering information about how best it is to market a company's services and help to

ensure that the organisation is running smoothly. Most records are stored electronically on a database.

Objectives of Documentation

- To record all the problems reported by users.
- To record the timing of the corrective action.
- To record the issues that are escalated and to whom.
- To record what action has been taken by whom.
- To record when the outstanding requests get cleared.

Right documentation can make a lot of the difference in getting quick resolutions.

To achieve this, certain steps need to be taken as shown in the following figure:

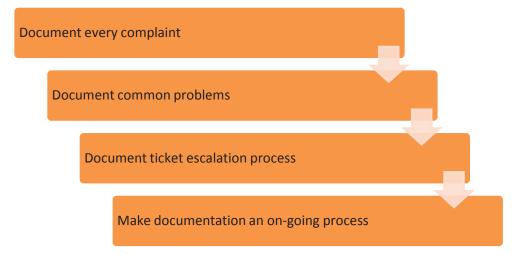


Fig. 4.4.8: Steps for right documentation

Document Every Complaint

The help desk technicians need to document issues as they come in. In addition to recording the symptoms described by the customers, they should probe for the right symptoms. For example, if a customer says that his computer is running slow, the help desk needs to differentiate whether the problem is caused by a virus or a malfunctioning hardware or an unpatched system.

The help desk technician should know how to ask the right questions to try and resolve an issue within the first call.

Document Common Problems

Majority of the help desk issues can be reduced to a handful of common problems. If there is a good documentation process that has resolution paths for all common problems, then the help desk technician does not have to reinvent the wheel for every ticket. He can use the internal help desk knowledge base and time tested processes to resolve the issues quickly.

A well organised process enables the help desk technician to respond to a ticket quickly and resolve most of the customers' problems immediately.

Document Ticket Escalation Process

A good escalation process makes sure that when the helpdesk technician is not able to resolve a problem, he addresses ticket escalation promptly. The ticket gets send to the next level of customer support and the customer does not have to wait for days for it to get resolved.

Documentation should be an on-going effort

Documentation is not a onetime effort; it needs to be an on-going process. The help desk technicians should regularly optimize the issue resolution procedures and processes. This ensures that the customer issues are resolved promptly.









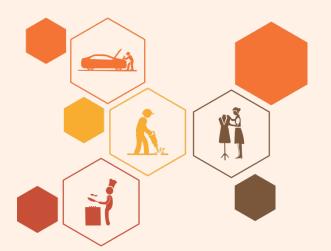


5. Coordinate with Colleagues and Coworkers

Unit 5.1 – Interacting with Supervisor

Unit 5.2 – Coordinating with Colleagues

Unit 5.3 – Interaction with Customers and Superiors



Key Learning Outcomes



At the end of this module, you will be able to:

- 1. Recognize the organizational goals and targets
- 2. Communicate with superior and subordinates
- 3. Manage Cross-functional interaction to accomplish productivity
- 4. Achieve inter-personal communication skills
- 5. Develop rapport with customers

Unit 5.1: Interacting with Supervisor

Unit Objectives



At the end of this unit, you will be able to:

- 1. Recognize the organizational goals and targets
- 2. Use inter-personnel skills to resolve issues
- 3. Communicate with superior and subordinates
- 4. Evaluate non-biased feedback from client regarding task completion

5.1.1 Work Requirements

As an IT service engineer in any organization, one of the major roles and responsibilities is to understand the work requirements. The following image shows a service engineer working on network servers after understanding the work requirements:



Fig. 5.1.1: Understand the work requirements

The major roles of an IT service engineer are as follows:

- With hardware and software glitches inevitable, an IT service engineer needs to come-up with solutions as soon as possible to eliminate any bottlenecks in terms of productivity. It is an integral part of maintaining a smoothly running working environment having zero tolerance for even major delays.
- Coordinating with customers, co-workers, subordinates and superiors is also defined as one of the major roles of an IT service engineer.

Having a clear picture about the work requirements determines the smooth functioning of an organization. This keeps the downtime of IT hardware and software to less than 1% at customer facility.

Understand Work Requirements and Targets

The targets and short term goals set by the organization determine the targets for the personnel. An IT service engineer needs to understand the goals set by the superiors.

Quarterly

Monthly

Weekly

Daily

The goals may be set with respect to timespan as listed in the following figure:

Fig. 5.1.2: Goals set by superiors

These goals then further define the targets to be assigned to the team responsible for all IT related personnel. The incentive policy should be clear so that the employees can understand the policy well. It will motivate them to put maximum effort in maintaining IT facility of an organization.

Any ambiguity in understanding the work requirements defined by the supervisor results in time delays and confusions. An IT service engineer needs to avoid such instances at all costs. For example, failing to understand the priority of jobs or tasks assigned by the supervisor for the day. Understanding the technical requirement is also equally important. So, while replacing faulty modules, an IT service engineer should check the warranty on the faulty module while replacing it and also ensure that no damage to the other hardware is done.

New Product Models

Since IT industry evolves at a very fast pace, service engineers need to be updated with the latest products, their software ecosystem and methods to operate the technologically advanced machines. New tech savvy hardware comes with a specific set of rules and operating methods. Therefore, service engineers need to acquire complete knowledge about their functioning.

The following image shows service engineers learning about new product models:

Fig. 5.1.3: Learning about the new models installed in a facility

An IT service engineer should do the following when working with a new product:

- Keep in mind the constraints related to the use of the new product to avoid any hardware or software failure.
- Comply with the codes put in place for the use of any machine or software.

Escalate Issues

With IT hardware equipment, breakdowns are normal happenings. Same is true for software installed to keep the hardware running. Any glitches with hardware, installed software or some compatibility issues between the two can result in downtime which can hamper productivity of any organization.

Any issue raised by the subordinates and other personnel of the organization regarding problems in the operating system, software like AutoCAD or hardware such as routers or switches should be conveyed to the concerned department/person at the earliest as shown in the following image:

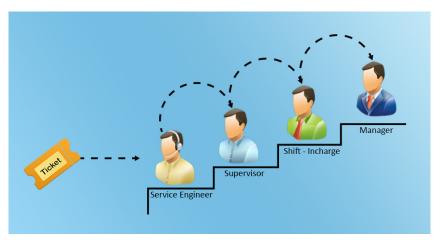


Fig. 5.1.4: Escalating issues to the concerned person

A service engineer should use a format for escalation of the different issues. One of the escalation form formats is shown in the following image:

Escalation Matrix

ID#	Month	Customer Name	PO Number	Description	Amount	Escalation Date	Escalation Reason	Status	
Kindly u	Kindly update escalation matrix everyday - Track your Customer through Identification number (ID) or Purchase Order Number (PO)								

Fig. 5.1.5: Format for escalating issues to the concerned department

Also, an IT service engineer should get in touch with the higher management if the raised concerns are not being addressed. There can be unnecessary bottlenecks created by the supervisors and such behavioural anomalies can hamper the productivity of a facility.

Receive feedback

Once the issue/problem is solved, feedback from the person or department is very important. This gives a clear idea regarding the improvements that can be done in reducing downtime of machines.

Feedback also helps to create a reference guide for the IT service engineers in an organization if the same problem creeps up again. Having discussions with the supervisor in relation to the problem and its solution solves a lot of intangible problems in the organization.

5.1.2 Inter-personnel Skills -

An IT service engineer not only needs to be acquainted with all the technical requirements of the facility, but also needs to have interpersonal skills to solve meagre issues.

Communication and the aptitude to solve problems, as and when they occur, is an important skill set which helps in the long run.

The ability to report problems in accordance with the guidelines and understandability of the supervisors and the higher management is preferred. A service engineer also needs to be skilful enough to resolve personnel grievances tactfully. The following image shows inter-personnel skills:



Fig. 5.1.6: Interacting with subordinates

Communicate Potential Hazards

Understanding all the possible hazards that can happen in a facility are the responsibilities of a service engineer. One possible cause of hazard could be the lack of clear understanding about the company's code of conduct or reference handbook which puts constraints on the use of equipment for purpose that is against the code of conduct. A service engineer can handle the hazard by:

- Communicating any such hazard to the supervisor can prevent unaffordable downtimes which could hamper critical functioning of the organization.
- Having clear communication with the other staff members and getting in place early warning systems for potential threats in another dimension.
- Making risk assessment is an integral part of an IT service engineer's job description.
 Potential hazards should be assessed with precision and supported with practical evidence.
- Adopting a systematic approach is one dimension of communicating potential hazards.

The following figure shows a systematic approach for handling hazards:



Fig. 5.1.7: Systematic approach for handling hazards

Report Problems in Field

Service engineers need to report any kind of problem (hardware or software) to supervisors keeping in mind the code of conduct. Proper communication of any kind of issue in the facility is important as misleading information can complicate the issue further.

Resolve Personnel Issues

Resolving personnel issues involves the followings:

- Communicating effectively with the personnel ensures positive feedback in the organization. Two-way communication within and beyond the facility is also advised for IT service engineers in any organization.
- All conflicts of interest, misunderstandings and personnel grievances need to be understood and then reported to the higher authority.
- Suggestions on resolving the problems is important as it helps the facility staff to concentrate on the job at hand.

Any personal issue or grievance also needs to be attended to by the service engineer himself before pushing the issue through to the supervisors. Managing the personnel is the most important part of team effort towards a unified goal.

5.1.3 Meet Targets

Just like any other job profile in an organization, meeting the targets set down by the management is very important. IT service engineers need to be clear about the goals and visions of the organization to achieve all the designated targets. The following figure shows the key points which will help an IT service engineer to meet the expected targets:

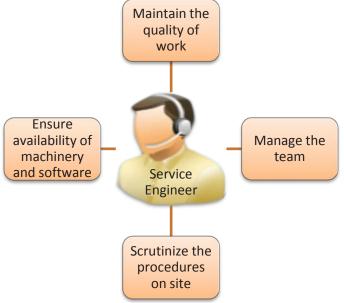


Fig. 5.1.8: Key points to remember for meeting targets

The quality of work needs to be maintained always in compliance with the referral handbook of the company. The job description of a service engineer also lays down the requirement for keeping the downtime of the machines to below 1 percent, otherwise it results in heavy losses during that period.

To keep up with the requirements, service engineers need to handle their team well. Learning about their skillset and deploying the suited personnel for a set of tasks gets the job done in the stipulated time period.

Ensure inspection of procedures on site. Making sure that individual roles and responsibilities are understood by the personnel is vital. Timely check of the machinery and software systems needs to be done to avoid any bottlenecks in achieving weekly or monthly targets.

5.1.4 Customer feedback -

Just like it is essential to address issues within the facility, it is also important to get feedback of the customers and clients. To maximize the potential of work done in an organization, service engineers need to make it a habit to get unbiased feedback from clients on the designated tasks performed.

The customer is always special and customer's feedback is the most important thing for an organization. The procedure as shown in the following figure should be followed:

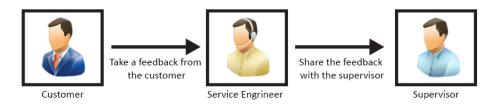


Fig. 5.1.9: Procedure to be followed for taking customer feedback

The time taken to resolve an issue, and the difficulties that a customer encountered while communicating the problem should be understood. The misunderstandings observed during the interaction should be clearly documented.

The methods of interaction and behavioural aspects also need to be considered in drawing conclusions after each task or problem handling routine. Getting honest feedback from clients helps to improve the organizational functioning for the greater good.

The service engineer can have a feedback form filled up by the customer at the facility. If the service engineer is working remotely, he/she may have an online feedback from the customer through email, chat or feedback SMS.

Unit 5.2: Coordinating with Colleagues

Unit Objectives



At the end of this unit, you will be able to:

- Explain achieving inter-personnel communication in an organization
- Manage Cross-functional interaction to accomplish productivity

A workplace that feels like a battlefield requires inculcating a sense of harmony and unity. These are the keys to develop a healthy and competitive environment in an organization of any sort. Higher the rank, bigger the responsibilities, and more complex the problems are. Holding the fort at an organization as a service engineer comes with its own highs and lows.

Taking into consideration the current scenario, the IT department is the backbone of any organization. Hence, it's no less than walking in the line of fire for a service engineer. However, the brighter side is that the person in charge always has the authority to command his/her team of skilled professionals whom he/she can deploy to ensure smooth workflow even if the environment is plagued.

The work group is united by the goals and missions of the organization, but, at times, small issues like varied viewpoint plague the work environment. Keeping everyone focused and motivated to work in synergy is what the role of a service engineer is.

5.2.1 Inter-personnel Interaction

Every worker works towards a common goal in an organization, still all of them are divided by certain roles and activities and the way they accomplish that objective. Interpersonnel communication - whether formal or informal - is the most common and important key to accomplish productivity and perform social functions in an organization. Inter-personnel communication defines form and functionality of an organization as all work groups require an active inter-personnel communication to accomplish productivity.

The primary objective of a service engineer is to understand the process and the health of the communication taking place among the co-workers in order to improve its quality. Doing so enables the service engineer to comprehend the way groups interact and work. The following figure shows the steps for ensuring spontaneous inter-personnel communication:



Fig. 5.2.1: Steps for ensuring spontaneous inter-personnel communication

Resolve Conflicts

As discussed earlier, individuals are divided by roles and responsibilities in an organization despite working towards a common goal. Hence possibility of conflicts is nearly unavoidable.

Here are a few tips to reinstate better communication among co-workers in such quandary.

Clarify role and responsibilities

Going to basics is the best way to resolve a problem. Role of a service engineer is to ensure a glitch-free workflow in an organization. He and his team will participate in addressing IT issues, whether small or big. Providing a more rounded perspective of job roles and responsibilities offers inculcation of a positive and resolute approach for problems among co-workers. Also, this enables people with less job experience take up things in a more constructive manner. The following image shows a service engineer clarifying roles and responsibilities to a team member:



Fig. 5.2.2: Clarifying roles and responsibilities to a team member

Plan strategically

In most organizations, conflicts between co-workers occur due to tight schedules and deadlines. Employees working on deadlines are required to work on short turnaround times, resulting in causing frustration and stress. Strategic planning in advance is the best way to avoid such circumstances. Irrespective of the team size, this can be achieved by deploying tools like Google Calendar to communicate deadlines. The following image shows planning using a calendar:



Fig. 5.2.3: Planning using a calendar

Receive Equipment/Tools from Stores

Getting the job done in a process depends on information communication. Furthermore, accuracy of the end result entirely depends on effective inter-personnel communication. For example, the IT department of an organization wants to replace old computers with the new ones, accurately and smoothly. The entire exchange process depends on how effectively the IT department communicated with the person in charge at the store, the requirement for infrastructure upgrade.

Customer Complaints in the Respective Geographical Area

Serving customers at an organization with a wide spectrum of consumer base poses additional challenges. Maintaining service quality in such cases can be a challenging task, owing to cultural and social diversity. However, such barriers can be overcome in a better way by giving the opportunity to a worker hailing from the respective geographical area. Addressing such problems in this way can improve the ability of an organization to implement strategies aimed at improving the service quality. The following images show the segmentation of the customer base to collect their complaints accordingly:





Fig. 5.2.4: Segmentation of customer base

Assist Colleagues

Be it work allocation, manpower distribution or identification of areas of high responsiveness, healthy communication is the key to improve service quality. Informal communication is what is usually seen to be dominant in most workplaces. People asking for help from the person sitting at the adjacent desk to troubleshoot an IT issue, rather than consulting an IT person, is one of the most common examples of informal communication. The communication is spontaneous and successful in achieving the goal, paving the way to formal inter-personnel communication. Despite having established communication procedures, the informal communications occur in every organization and help in resolving problems and conflicts in real time. Hence, the role of a service engineer is to understand potential of this form of communication and further it with the help of modern-day technologies.

The following image shows colleagues assisting each other:

Fig. 5.2.5: Colleagues assisting each other

5.2.2 Cross Functional Interaction

Success of an organizational plan depends on effectiveness of training, goal-oriented action planning and motivation. However, another key element that deserves a special consideration is cross-functional communication. Cross-functional communication is a method of understanding the importance of liaising and collaborating with other key departments of an organization. The following image shows cross functional interaction:

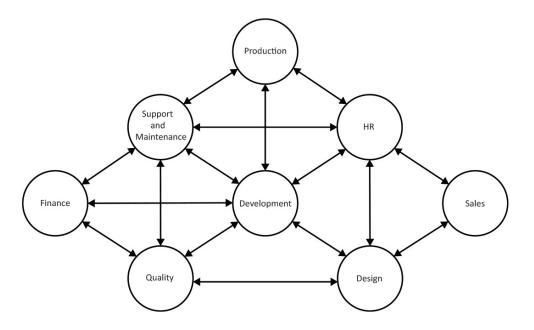


Fig. 5.2.6: Cross functional interaction

This is how workers learn the skills of persuasion and negotiation required for effective teamwork and synergy. Any plan or strategy cannot yield desired results until cross functional communication is flawless, because this is the key factor to determine the level of motivation and skills of the team needed to achieve the goal.

Interact with Colleagues from Different Functions

Cross-functional communication implies working closely with people from different functions in an organization to send a message. This is important because it impacts success of an organization significantly. Working in collaboration with colleagues and looking forward to interacting with them is a way of bringing fun in work.

A work environment where teamwork is a culture, always yields more results than a low-morale and individual work environment. This is because generally everyone cares about people they work with. Taking onus of an assigned job role and getting it done in collaboration with people from other departments makes an effective work relationship and a win-win situation for both. The following image shows collaboration with people from different departments:



Fig. 5.2.7: Collaboration with people from different departments

Conducive work relationship is purely dependent on effective inter-personnel communication, which in turn decides the success of an organization and its plans and strategies. Work relationships that take place in an organization could be within the department, with colleagues of other departments and customers. Establishing healthy work relationships depends on cooperation with other departments while dealing with conflicts of interest through good communication to achieve common missions.

Understand their Workload

Developing a culture of teamwork is an important step. Training them to work flawlessly as a team is the next step towards building a cross functional communication for pursuing

a long-term goal, because a close-knit work environment positively affects a team and the individuals. Be it understanding stress level and workload, or simply participating in small victories they make while overcoming hurdles in day-to-day work, building relationships with people of other departments strengthens an organization in unexpected ways.

Unit 5.3: Interaction with Customers and Superiors

Unit Objectives 6



At the end of this unit, you will be able to:

- 1. Explain a service level contract
- 2. Communicate with customers and superiors
- 3. Develop rapport with customers
- 4. Develop interpersonal and decision making skills

5.3.1 Introduction

As a service engineer, there are certain roles that come by default. Yet, the job requisite of a service engineer remains to service the machinery and electronics and look after its upkeep from time to time. Since, service engineers are involved largely in maintaining and servicing worn out electrical equipment, they are also known as maintenance engineers or field service engineers.

The service engineer is required to review each electrical equipment after a specific period of time. The idea is to find faults and then rectify them to avoid major mechanical failures in the near future.

The job of a service engineer does not end at just examining or maintaining the equipment. Once an equipment, for example a computer is worked upon, the engineer is required to create a detailed report on the changes made, and the next supposed date when the hardware or the software on the system may require repair or update.

In the role of a service engineer, an individual has to fulfil a host of responsibilities. Major responsibilities are as shown in the following figure:

To provide customers with on-site installation of equipment

- •To provide hands-on, on-site technical support and training to customers
- •To perform troubleshooting, service and repair of equipment as and when necessary at the customer's location

To create documentation of all services and repairs and maintain service information in the organisational database

Fig. 5.3.1: Major responsibilities of a service engineer

Working with Customers

Service engineers are not shut away in the workshops or customer labs. They're at the centre of an organization. They are required to professionally handle customer service calls, address issues arising from field service visits, and ensure customer satisfaction.

With advancement in technology, computers are doing to the brains, what steam engines did to the trains – they are steering the path. This has shifted the service engineer's work from mere physical to mental labour, which suggests each support, service or repair work is time bound. The work has to be completed as per the customer's timeline so as to avoid a lag in the work process and thus influence the customer's ultimate targets.

Good communication skills can help a technician build rapport with a customer. Built up trust ensures that the customer can explain the problem in detail (if customers do not have trust in the technician, they may not divulge complete information, fearing data theft). Detailed information can decrease the service engineer's turnaround time, limiting disturbance in the customer's workflow.

Understanding Service Level Agreement

Managing the expectation of a customer in an IT-based service business is not easy for a service engineer. The expectations can turn into a grave problem if the responsibilities and the roles of both the parties are not clearly defined on paper and agreed upon by both the customer and the service provider.

An agreement of a sort is therefore important to understand that both the parties – customer and organisation— have duties and responsibilities to each other and these must be properly detailed. This is where Service Level Agreement(SLA) comes in. An SLA is a formal contract between the service provider and the customer, defining services, responsibilities, scope and duties of both the parties. For instance, an IT service company may offer routine inspection and maintenance service for a certain period of time as part of one time cost at the time of purchase of equipment.

The following image shows an SLA:



Fig. 5.3.2: Writing out an SLA

It's important for the service engineer to read and understand the SLA before visiting a customer, so that all the queries, support and service can be addressed according to the terms specified. This will minimize all the issues related to service expectations of a customer.

Communicating Contractual Matters and Customer Concerns to Superiors

The service engineer should know the line of communication to communicate the customer concerns. The following figure shows the line of communication:

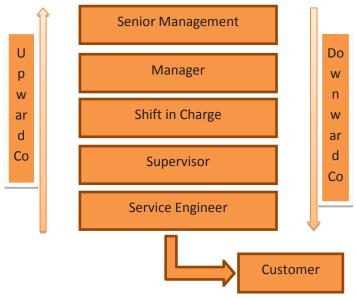


Fig. 5.3.3: Line of communication

Service engineer is a company representative that walks out to the customer's territory to fix issues that may have crept up in the machinery supplied by the organization.

Customers can have varied queries and issues, and at times, some may even fall beyond the scope of the signed SLA. The service engineer should respond to these queries in the ways as shown in the following figure:

Understand customer query and help resolve it if possible

If the solution is beyond the contract purview, take up the issue with the seniors before committing anything to the customer on-site

Fig. 5.3.4: Ways to respond to the customer queries

Contract and agreements are largely generic and real on-field situations can be lot different to what the SLA may cover. If there is an issue brought up by a customer, which should be

resolved even out of the scope of the contract, it is important for a service engineer to take such an issue to the superiors.

A service engineer should perform the following steps for an assigned task to be completed:

Provide the superior with general overview of the problem

Show the specific impact it has on customer's business and own organization's image

Explain how the problem could be addressed

Clearly define specific approach or alternative options along with supposed options

Fig. 5.3.5: Steps for an assigned task to be completed

5.3.2 Communication Skills

Service engineers need to be excellent communicators to ensure their work is properly understood by the customers, colleagues and superiors. The following figure lists the persons with whom the service engineer has to communicate:

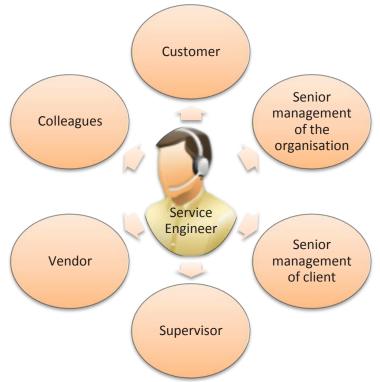


Fig. 5.3.6: Persons with whom a service engineer communicates

The service engineer may also be required to communicate in local language to understand the customers' queries and suggest them appropriate solutions where service alone would not solve the purpose. For example, a customer located in a remote area requires his computer serviced but can only converse in the local language. During on-site visit, after the computer disk drive is repaired, the customer should be advised by the service engineer to place a DVD gently in the disk drive, amid other suggestions, in the language best understood.

Seeking Details to Assess the Problem and Suggesting Solution to Customer

Each customer will have a different problem, and a very different idea of what customer services means to them. Therefore, to provide appropriate customer service, a service engineer must be able to communicate well to understand the customer's needs and provide accurate solution to the problem.

Without details, a service engineer cannot assess the problem correctly. Also, without being able to provide service on-site, a service engineer is of no use. It's important thus to communicate to understand the area of issue properly. A detailed investigation alone will lead the engineer to the root of the problem, which will then become easy to solve.

As a customer service representative at the customer's location, a service engineer may be required to 'tell the customer what they want to hear,' but that's not a good practice, even though all representatives are trained to do so. The correct thing will be to suggest real solutions to the customer. To ensure customer satisfaction the service engineer must do the following steps:



Fig. 5.3.7: Steps to ensure customer satisfaction

For example, a customer is facing a problem where the computer is overheating. Easy solution would be to tell the customer that the fan is not working properly and it requires replacement. Suggestive solution would be to request the customer to place the system in an airy space and clean the fan through the vent using an air blower and to inform if the problem persists.

Assisting and Educating Customers about Warranty and Precautions

A service engineer out for an on-site visit to the customer's location must detail the requisites regarding warranty to the customer. This will educate the customer on whether the equipment is in warranty or not.

The following figure lists some important information that a technician should communicate to the customer:

Tell the customer about warranty period and the parts covered under the warranty

Detail the process of replacement of any faulty component and tell about the cost of service

Inform the customer about the precautions to be taken to avoid malfunction

Fig. 5.3.8: Information to be shared with the customer

5.3.3 Interpersonal skills

The work of a service engineer is not just technical; a service engineer's job role requires the individual to frequently liaison with customers. Additionally, the engineer also has to work in multi-disciplinary teams, interacting with colleagues and seniors. Therefore, the individual is required to have strong interpersonal skills.

Good relationship with your customers and vendors is vital, but it is equally important to ensure that the relationship is documented properly, so that the decisions on the relationship can be taken in accordance with it. The following figure shows essentials of interpersonal skills:



Fig. 5.3.9: Essentials of interpersonal skills

Managing Vendors and Building Rapport with Customers

In addition to being a skilled engineer, a specialist service engineer also has to adopt the role of a good bargainer and become a good face of the organisation — as the technician will deal with vendors to close deals and provide on-site customer assistance. The service engineer has to liaison with customers and vendors and interact with them to understand and explain details provided in the service level agreement. A clear understanding of the SLA ensures that there are no issues later, when an equipment is purchased from a vendor, or when it requires service at the customer's location.

When dealing with vendors, a service engineer presents a detailed work requirement and makes self-assessment of the requirement. Talking and detailing the essentials, the engineer finalizes a deal that is mutually beneficial for both the organisation and the customers in the long run.

Outside the purview of the organisation, service engineers are as good as customers judge them to be. It is essential for service engineers to build rapport with customers to better understand their problem and address it to perfection. The following figure lists the benefits of building rapport with customers:

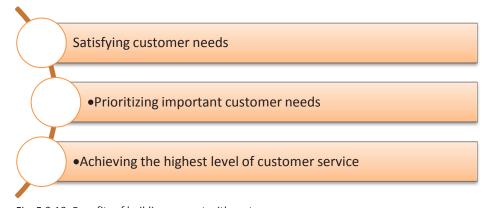


Fig. 5.3.10: Benefits of building rapport with customers

5.3.4 Behavioural skills

With the good comes the bad; this phrase just becomes right when dealing with difficult customers. Most of the time, this may be because of uncontrollable situations such as a manufacturing defect. But at times this can be related to service or after sales issues. In either case a service engineer has to keep a cool head and deal with the issues maturely.

The service engineer should collaborate and communicate clearly the issue to the customer and in some cases if it's necessary, to the superiors. The service engineer should be able to see the bigger picture while deferring perspectives, and effectively prioritise situations.

A service engineer working effectively on the field can be professionally groomed to handle situations. The individual should continuously strive for improvement in etiquette while

dealing with customers, so that even the most difficult of customers can return with satisfaction and goodwill.

Dealing with Customers

Primarily, the service engineer must listen to the customer, even if the viewpoint is the same – let the customer vent it off. After the customer has finished, express feeling and apologize for the inconvenience in a supportive way.

Provide immediate response to the problem detailed by the customer, if possible. At times, it may mean bending the rules, but customer satisfaction is the key, and going out of the way can just hit the nail on its head. For example, it's better to assist and resolve the problem of a customer who may be creating a scene in front of other customers.

5.3.5 Decision Making Skills

Decision making is a difficult thing. Nearly every decision involves some sort of conflict or dissatisfaction. But the difficult part is – decisions have to be made – and a service engineer generally has to make decisions on the fly.

Decision making is necessary majorly in case of dissatisfied and difficult customers. There can be an odd situation when the issues at hand are beyond the permissible limits of a service engineer's profile. This is when decision has to be made whether to take up the query to a superior or just escalate the issue with the vendor.

Role Play



You are a service engineer. You are given the responsibility of providing personal counselling to a disgruntled subordinate. The person is not able to cope with the functionality of facility machines due to non-understanding of an easy to learn skill. Handle this situation.

Role Play



You are a service engineer. You just received a phone call from an angry customer, who has complained of an overheating computer system twice before. The system is responding poorly and the hassled customer's business is being affected. Fan replacement is not covered in the service contract but it is vital here. How should the situation be handled?

Role Play



Say you are a service engineer. A computer that you sold to a customer was expected to have 1TB hard disk drive. Due to some manufacturing error, which went unnoticed with the vendor and you, the system had only 500GB hard disk. The customer gets angry at you in front of 10 other customers. This is when you have to decide that on what priority you will address the customer's issue and how you will tackle the problem.

Should the issue be taken to the superior, or should it be escalated directly to the vendor?









6. Soft Skills and Work Ethics

Unit 6.1 – Effective Communication and Coordination at Work

Unit 6.2 – Working Effectively and Maintaining Discipline at Work

Unit 6.3 – Maintaining Social Diversity at Work





By the end of this unit, participants will be able to:

- 1. State the importance of work ethics and workplace etiquette
- 2. State the importance of effective communication and interpersonal skills
- 3. Explain ways to maintain discipline in the workplace
- 4. Discuss the common reasons for interpersonal conflict and ways of managing them effectively.

UNIT 6.1: Efffecte Communicacation aCoordinainati t Work

Unit Objectives | ©



By the end of this unit, participants will be able to:

- 1. Work efffectely at the workplace.
- 2. Demonstrate practices related to gender and PwD sensitazation.

6.1.1 Importance of Work Ethics and Workplace Etiquette

Workplace ethics are a set of moral and legal guidelines that organizations follow. These guidelines influence the way customers and employees interact with an organization. Workplace ethics essentially guide how an organization serves its clients and treats its employees.

For example, if a company seeks to fulfil the promises it makes, it may develop processes and set up a robust support system to address this policy and build customer/client loyalty. To achieve this goal, the company may implement specific incentive programs for employees to encourage them to produce high-quality work and ensure the organization fulfils the promises it makes to its clients/ customers.

Many organizations, often the large ones, set detailed ethical codes to guide their operations and control how the organizational processes impact the stakeholders. These ethics usually help organizations maintain certain standards of responsibility, accountability, professionalism and among others, as they navigate through different challenges and day-to-day circumstances. By following these guidelines, organizations often experience several benefits that improve the lives of stakeholders, such as customers, employees, leaders, etc.

Examples of Common Workplace Ethics



Fig. 6.1.1 Examples of Common Workplace Ethics

Workplace ethics are essential for a successful organization with a satisfied and loyal team. High ethical standards help in ensuring all stakeholders, such as customers, investors, employees, and other individuals involved in the workplace operations, feel the organization is safeguarding their interests. By creating and implementing ethical guidelines, organizations can keep the best interests of their employees in mind while maintaining a positive influence on those they impact through their processes. As a result, employees maintain the organization's best interests by being ethical in their daily work duties. For example, fairly-treated employees of an organization who understand the organization's commitments to environmental sustainability are usually less likely to behave in a manner that causes harm to the environment. Thus, they help maintain a positive public image of the organization. It means that workplace ethics help in maintaining reciprocal relationships that benefit organizations at large and the individuals associated with and influenced by the organizational policies.

Benefits of Workplace Ethics

There are various benefits of implementing workplace ethics. When organizations hold themselves to high ethical standards, leaders, stakeholders, and the general public can experience significant improvements. Following are some of the key benefits of employing ethics in the workplace:



Fig. 6.1.2 Benefits of Workplace Ethics

6.1.2 Interpersonal Communication

Interpersonal communication is a process that involves sharing ideas and emotions with another person, both - verbally and non-verbally. It is essential to interact effectively with others in both personal and professional lives. In professional life or the workplace, strong interpersonal skills play a crucial role in achieving effective collaboration with colleagues.

Interpersonal Skills

Interpersonal skills, in other terms, are known as people skills, which are used to communicate and interact with others effectively. These are soft skills one uses to communicate with others and understand them. One uses these skills in daily life while interacting with people

Examples of Interpersonal Skills



Fig 6.1.3 Examples of Interpersonal Skills

Numerous interpersonal skills involve communication. Communication can be verbal, such as persuasion or tone of voice — or non-verbal, such as listening and body language.

Importance of Interpersonal Skills

Interpersonal skills are essential for communicating and collaborating with groups and individuals in both personal and professional life. People with strong interpersonal skills often are able to build good relationships and also tend to work well with others. Most people often enjoy working with co-workers who have good interpersonal skills.

Among other benefits of good interpersonal skills is the ability to solve problems and make the best decisions. One can use the ability to understand others and good interpersonal communication skills to find the best solution or make the best decisions in the interest of everyone involved. Strong interpersonal skills help individuals work well in teams and collaborate effectively. Usually, people who possess good interpersonal skills also tend to be good leaders, owing to their ability to communicate well with others and motivate the people around them.

Interpersonal communication is the key to working in a team environment and working coollectely to achieve shared goals. Following are the interperso

Verbal Communication

The ability to speak clearly, appropriately and confidently can help one communicate effectively with others. It is vital to select the appropriate vocabulary and tone for the target audience.

For example – one should speak formally and professionally in the work environment, while informal language is acceptable in an intimate environment with close friends and family. Also, one should avoid using complex or technical language while communicating with an audience that may not be familiar with it. Using simple language in a courteous tone helps achieve better communication, irrespective of the audience.

Active Listening

Active listening is defined as the ability to pay complete or undivided attention to someone when they speak and understand what they are saying. It is important for effective communication because without understanding what the speaker is saying, it becomes difficult to carry forward a conversation. One should ensure to use appropriate verbal and non-verbal responses, e.g. eye contact, nodding, or smiling, to show interest in what the speaker says. Active listening is also about paying attention to the speaker's body language and visual cues. Asking and answering questions is one of the best ways to demonstrate an interest in conversing with the other person.

Active listening is critical for communicating effectively without ambiguity. It helps one understand the information or instructions being shared. It may also encourage co-workers to share their ideas, which ultimately helps achieve collaboration.

Body Language

One's expression, posture, and gestures are as important as verbal communication. One should practice open body language to encourage positivity and trust while communicating. Open body language includes - maintaining eye contact, nodding, smiling and being comfortable. On the other hand, one should avoid closed body language, e.g. crossed arms, shifting eyes and restless behaviour.

Empathy

Empathy is the ability to understand the emotions, ideas and needs of others from their point of view. Empathy is also known as emotional intelligence. Empathetic people are good at being aware of others' emotions and compassionate when communicating with them. Being empathetic in the workplace can be good to boost the morale of employees and improve productivity. By showing empathy, one can gain the trust and respect of others.

Conflict Resolution

One can use interpersonal communication skills to help resolve disagreements and conflicts in the workplace. This involves the application of negotiation and persuasion skills to resolve arguments between conflicting parties. It is also important to evaluate and understand both sides of the argument by listening closely to everyone involved and finding an amicable solution acceptable to all.

Good conflict resolution skills can help one contribute to creating a collaborative and positive work environment. With the ability to resolve conflicts, one can earn the trust and respect of co-workers.nal communicationskills that vital for success at work:

Teamwork

Employees who communicate and work well in a team often have better chances of achieving success and common goals. Being a team player can help one avoid conflicts and improve productivity. One can do this by offering to help co-workers when required and asking for their feedback and ideas. When team members give their opinions or advice, one should positively receive and react to the opinions/advice. One should be optimistic and encouraging when working in groups.

Improving Interpersonal Skills

One can develop interpersonal skills by practising good communication and setting goals for improvement. One should consider the following tips to improve their interpersonal skills:

- One should ask for feedback from co-workers, managers, family or friends to figure out what needs improvement concerning their interpersonal skills.
- One can identify the areas of interpersonal communication to strengthen by watching others.
- One can learn and improve interpersonal skills by observing co-workers, company leaders and
 professionals who possess good interpersonal skills. This includes watching and listening to them to
 note how they communicate and the body language used by them. It is vital to note their speed of
 speaking, tone of voice, and the way they engage with others. One should practice and apply such
 traits in their own interactions and relationships.
- One should learn to control their emotions. If stressed or upset, one should wait until being calm to have a conversation. One is more likely to communicate effectively and confidently when not under stress.
- One can reflect on their personal and professional conversations to identify the scope of improvement and learn how to handle conversations better or communicate more clearly. It helps to consider whether one could have reacted differently in a particular situation or used specific words or positive body language more effectively. It is also vital to note the successful and positive interactions to understand why they are successful.
- One should practice interpersonal skills by putting oneself in positions where one can build relationships and use interpersonal skills. For example, one can join groups that have organized meetings or social events. These could be industry-specific groups or groups with members who share an interest or hobby.
- Paying attention to family, friends and co-workers and making efforts to interact with them helps a
 lot. One should complement their family, friends and co-workers on their good ideas, hard work and
 achievements. Trying to understand someone's interests and showing interest in knowing them can
 help one build strong interpersonal skills. Offering to help someone, especially in difficult situations,
 helps build stronger and positive workplace relationships.
- One should avoid distractions, such as a mobile phone, while interacting with someone. Giving
 someone full attention while avoiding distractions helps achieve a clear exchange of ideas. By
 listening with focus, one can understand and respond effectively.

- One can attend appropriate courses on interpersonal skills or sign up for workshops at work to improve interpersonal skills. One can find many resources online also, such as online videos.
- For personal mentoring, one can approach a trusted family member, friend, co-worker, or current/ former employer. A person one looks up to with respect and admires is often a good choice to be selected as a mentor. One can even hire a professional career or communication coach.

Interpersonal communication skills often help one boost their morale, be more productive in the workplace, complete team projects smoothly and build positive and strong relationships with coworkers.

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UNIT 6.2: Working Efffectely and Maintaining Discipline at Work

Unit Objectives | ©



By the end of this unit, participants will be able to:

- · Discuss the importance of following organizational guidelines for dress code, time schedules, language usage and other behavioural aspects
- Explain the importance of working as per the workflow of the organization to receive instructions and report problems
- · Explain the importance of conveying information/instructions as per defined protocols to the authorised persons/team members
- Explain the common workplace guidelines and legal requirements on non-disclosure and confidentiality of business-sensitive information
- · Describe the process of reporting grievances and unethical conduct such as data breaches, sexual harassment at the workplace, etc.
- Discuss ways of dealing with heightened emotions of self and others.

6.2.1 Discipline at Work

Discipline is essential for organizational success. It helps improve productivity, reduce conflict and prevent misconduct in the workplace. It is important to have rules concerning workplace discipline and ensure that all employees comply with them. In the absence of discipline, a workplace may experience conflicts, bullying, unethical behaviour and poor employee performance. An efficient workplace disciplinary process helps create transparency in the organization. Benefits of disciplinary standards:

All employees follow the same rules which helps establish uniformity and equality in the workplace

Managers and supervisors have defined guidelines on what accon to take while initi atg disciplinary y aon

With well-defined and enforced disciplinary rules, an organiizaon can avoid various safety, security, rupati nal risks

Fig 6.2.1 Benefits of Disciplinary Standards

Maintaining an organized and cohesive workforce requires maintaining discipline in both personal and professional behaviour. It is important to follow the appropriate measures to keep employees in line without affecting their morale.

Defining Discipline

The first and crucial step in maintaining workplace discipline is to define what is meant by discipline. It helps to evaluate common discipline problems and devise guidelines for handling them effectively.

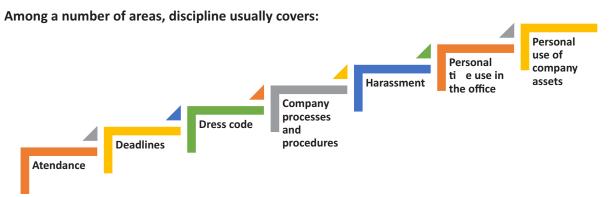


Fig 6.2.2 Examples of Workplace Discipline

According to demography and local issues, it may also include substance use and related issues.

It is vital for a workplace to have an employee handbook or company policy guide, to serve as a rulebook for employees to follow. The employee handbook/ company policy guide should be reviewed and updated periodically according to any issues or areas, or concerns identified concerning workplace discipline. Such manuals should also cover all the laws and regulations governing workplace behaviour.

Defining and documenting workplace rules aids in their implementation, ensuring little or no ambiguity. All employees in a workplace should also have easy access to the workplace guidelines so that they can refer to them to get clarity whenever required. To maintain discipline at work, it is also critical to ensure uniform application of workplace guidelines to all employees without exception.

6.2.2 Employee Code of Conduct

The employee code of conduct manual serves as a guide for employees to inform them regarding the behaviour expected from them at work. It helps create a good work environment with consistent behaviour from employees. The manual should list examples of acceptable and not acceptable behaviours at work. The code of conduct should be discussed with employees so that they have the clarifications required.

For example, an organization may create guidelines concerning the conduct with clients to ensure no contact is made with them except for business purposes, also prescribing the use of appropriate means of communication.

Employees should have a clear understanding concerning their job responsibilities and the behaviour expected from them with all stakeholders, e.g. company personnel, clients and associated third parties. It is critical to have documented guidelines for employees to follow concerning all aspects of work. It should also document the disciplinary action to be followed in case of non-compliance, e.g. verbal and

then written warning, temporary suspension or eventual termination of service in case of repeated non-compliance with the employee code of conduct. Employees should know what the company rules are and what will happen if they break the rules. However, disciplinary action should be initiated only when reasonably required to avoid its misuse for employee harassment.

There should also be an effective mechanism for employees to raise their concerns/ grievances and have them addressed while maintaining privacy, as required, e.g. raising concerns regarding the behaviour of a co-worker.

The employee code of conduct manual must be duly reviewed and approved by the concerned stakeholders, such as the Human Resources (HR) department and company executives.

6.2.3 Interpersonal Conflicts

Interpersonal conflict is any type of conflict between two or more people. These are found in both - personal and professional relationships - among friends, family, and co-workers. In the workplace, interpersonal conflict is often observed when a person or group of people interfere with another person's attempts at completing assignments and achieving goals. It is critical to resolve conflicts in the workplace to boost the morale of employees, repair working relationships among them, and improve customer satisfaction.

Reasons for Workplace Conflicts

Workplace conflicts are often observed when two or more people have different points of view. This can happen between managers, co-workers, or clients and customers. In general, interpersonal conflicts are caused by a lack of communication or unclear communication.

Some of the leading reasons for workplace conflicts are:

- · Difference in values
- Personality clashes
- · Poor communication

Example of poor communication – if a manager reassigns a task to another employee without communicating with the employee to whom it was originally assigned, interpersonal conflict can arise among them. This may potentially make the first employee, i.e. who was originally assigned the task, feel slighted and mistrusted by the manager. It may even cause animosity in the first employee toward the employee who has now been assigned the task.

Types of Interpersonal Conflict

Following are the four types of interpersonal conflicts:

a. Policy-related interpersonal conflict

When a conflict relates to a decision or situation that involves both parties, it can be called a policy-related interpersonal conflict. Example – two people or groups working on the same project, trying to adopt different approaches. To resolve policy-related interpersonal conflicts, the parties involved should try to look for a win-win situation or make a compromise. This is especially critical to resolve trivial issues so that work is not affected and common goals are achieved.

b. Pseudo-conflicts

Pseudo-conflict arises when two people or groups want different things and cannot reach an agreement. Pseudo-conflicts usually involve trivial disagreements that tend to hide the root of the issue.

c. Ego-related interpersonal conflicts

In ego conflicts, losing the argument may hurt or damage a person's pride. Sometimes ego conflicts arise when a number of small conflicts pile up on being left unresolved. To resolve ego-related conflicts, it's best to find the root of the issue and work towards a resolution.

d. Value-related interpersonal conflicts

Sometimes conflicts may occur between people when they have different value systems. Such conflicts can be difficult to identify initially, making the people involved think the other party is being disagreeable or stubborn, wherein they just have different values. Some co-workers may highly value their personal/ family time after office that they may be unreachable to clients during non-office hours, while others may place a high value on client satisfaction and may still be available for clients during non-office hours. Conflict may arise among such people when they may be required to coordinate to help a client during after-office hours. Value-related interpersonal conflicts are often difficult to settle since neither party likes to compromise.

Resolving Interpersonal Conflicts

Conflicts are usually likely in the workplace; they can, however, be prevented. Often resolving interpersonal conflicts through open communication helps build a stronger relationship, paving the way for effective coordination and success. Some ways to resolve interpersonal conflict:

• **Communication** - A great way to resolve interpersonal conflicts is for the opposing parties to listen to one another's opinions and understand their viewpoints. Meeting in person and keeping the conversation goal-oriented is important. One can have effective communication by following some measures, e.g. staying on the topic, listening actively, being mindful of the body language, maintaining eye contact, etc.

- Active Listening One should patiently listen to what the other person is saying without interrupting
 or talking over them. It helps one display empathy and get to the root of the issue. Asking questions
 to seek clarification when required helps in clear communication and conveys to the other person
 that one is listening to them. Practising active listening is a great way to improve one's
 communication skills.
- **Displaying Empathy** Listening attentively and identifying the anxieties/ issues of co-workers is a great way to show empathy and concern. It is essential to understand their feelings and actions to encourage honesty and avoid future conflict.
- Not Holding Grudges With different types of people and personalities in a workplace, it is common
 for co-workers to have conflicts. It is best to accept the difference in opinions and move on. Being
 forgiving and letting go of grudges allows one to focus on the positive side of things and perform
 better at work.

Work-related interpersonal conflicts can be complicated because different people have different leadership styles, personality characteristics, job responsibilities and ways in which they interact. One should learn to look above interpersonal conflicts, resolving them to ensure work goals and environment are not affected.

6.2.4 Importance of Following Organizational Guidelines

Policies and procedures or organizational guidelines are essential for any organization. These provide a road map for the operations of the organization. These are also critical in ensuring compliance with the applicable laws and regulations by guiding the decision-making process and business operations.

Organizational guidelines help bring uniformity to the operations of an organization, which helps reduce the risk of unwanted and unexpected events. These determine how employees are supposed to behave at work, which ultimately helps the business achieve its objectives efficiently.

However, organizational guidelines are ineffective and fail to serve their purpose if they are not followed. Many people don't like the idea of following and abiding by specific guidelines. Such people should be made to understand the benefits of following the organizational guidelines. Some of the key benefits are given below:

With well-defined organizational guidelines in place, no individual can act arbitrarily, irrespective of their position in the organization. All individuals will know the pros and cons of taking certain actions and what to expect in case of unacceptable behaviour. Benefits of following organizational guidelines:

Consistent processes and structures - Organization guidelines help maintain consistency in
operations, avoiding any disorder. When all employees follow the organizational guidelines, an
organization can run smoothly. These ensure that people in different job roles operate as they are
supposed to, knowing what they are responsible for, what is expected of them, and what they can
expect from their supervisors and co-workers. With clarity in mind, they can do their jobs with
confidence and excellence. With every person working the way intended, it's easy to minimise
errors.

With all the staff following organizational guidelines, the organization has a better scope of using time and resources more effectively and efficiently. This allows the organization to grow and achieve its objectives.

- Better quality service By following organizational guidelines, employees perform their duties
 correctly as per the defined job responsibilities. It helps enhance the quality of the organization's
 products and services, helping improve the organization's reputation. Working with a reputable
 organization, employees can take pride in their work and know they are contributing to the
 reputation.
- A safer workplace When all employees follow organizational guidelines, it becomes easy to
 minimise workplace incidents and accidents. It reduces the liabilities associated with risks for the
 organization and limits the interruptions in operations. Employees also feel comfortable and safe in
 the workplace, knowing their co-workers are ensuring safety at work by following the applicable
 guidelines.

Different organizations may have different guidelines on dress code, time schedules, language usage, etc. For example – certain organizations in a client-dealing business requiring employees to meet clients personally follow a strict dress code asking their employees to wear formal business attire. Similarly, organizations operating in specific regions may require their employees to use the dominant regional language of the particular region to build rapport with customers and serve them better. Certain organizations, such as banks, often give preference to candidates with knowledge of the regional language during hiring.

Working hours may also differ from one organization to another, with some requiring employees to work extra compared to others. One should follow the organizational guidelines concerning all the aspects of the employment to ensure a cohesive work environment.

6.2.5 Workflow -

Workflow is the order of steps from the beginning to the end of a task or work process. In other words, it is the way a particular type of work is organised or the order of stages in a particular work process.

Workflows can help simplify and automate repeatable business tasks, helping improve efficiency and minimise the room for errors. With workflows in place, managers can make quick and smart decisions while employees can collaborate more productively.

Other than the order that workflows create in a business, these have several other benefits, such as:

• Identifying Redundancies - Mapping out work processes in a workflow allows one to get a clear, top-level view of a business. It allows one to identify and remove redundant or unproductive processes.

Workflow gives greater insights into business processes. Utilizing such useful insights, one can improve work processes and the bottom line of the business. In many businesses, there are many unnecessary and redundant tasks that take place daily. Once an organization has insight into its processes while preparing workflow, it can determine which activities are really necessary.

Identifying and eliminating redundant tasks creates value for a business. With redundant tasks and processes eliminated, an organization can focus on what's important to the business.

• Increase in Accountability and Reduction in Micromanagement - Micromanagement often causes problems in a business setting as most employees don't like being micromanaged, and even many managers don't like the practice. Micromanagement is often identified as one of the reasons why people quit their job.

However, the need for micromanagement can be minimized by clearly mapping out the workflow. This way, every individual in a team knows what tasks need to be completed and by when and who is responsible for completing them. This makes employees more accountable also.

With clearly defined workflow processes, managers don't have to spend much time micromanaging their employees, who don't have to approach the manager to know what the further steps are. Following a workflow, employees know what is going on and what needs to be done. This, in turn, may help increase the job satisfaction of everyone involved while improving the relationships between management and employees.

- Improved Communication Communication at work is critical because it affects all aspects of an
 organization. There are instances when the main conflict in an organization originates from
 miscommunication, e.g. the management and employees disagreeing on an aspect, despite
 pursuing the same objectives. Poor communication is a common workplace issue that is often not
 dealt with.
- This highlights why workflow is important. Workplace communication dramatically can increase
 with the visibility of processes and accountability. It helps make the daily operations smoother
 overall.

Better Customer Service - Customers or clients are central to a business. Therefore, it is imperative
to find and improve ways to improve customer experience. Relying on outdated manual systems
may cause customer requests or complaints to be overlooked, with dissatisfied customers taking
their business elsewhere. However, following a well-researched and defined workflow can help
improve the quality of customer service.

By automating workflows and processes, an organization can also reduce the likelihood of human error. This also helps improve the quality of products or services over time, resulting in a better customer experience.

6.2.6 Following Instructions and Reporting Problems

All organizations follow a hierarchy, with most employees reporting to a manager or supervisor. For organizational success, it is vital for employees to follow the instructions of their manager or supervisor. They should ensure they perform their duties as per the given instructions to help achieve the common objectives of the organization and deliver quality service or products. This consequently helps maintain the reputation of the organization.

It is also important to be vigilant and identify problems at work or with the organizational work processes. One should deal with the identified within their limits of authority and report out of authority problems to the manager/ supervisor or the concerned person for a prompt resolution to minimise the impact on customers/clients and business.

6.2.7 Information or D ta Sharing

Information or data is critical to all organizations. Depending on the nature of its business, an organization may hold different types of data, e.g. personal data of customers or client data concerning their business operations and contacts. It is vital to effective measures for the appropriate handling of different types of data, ensuring its protection from unauthorized access and consequent misuse.

One should access certain data only if authorised to do so. The same is applicable when sharing data which must be shared only with the people authorised to receive it to use it for a specific purpose as per their job role and organizational guidelines. For example — one should be extra cautious while sharing business data with any third parties to ensure they get access only to the limited data they need as per any agreements with them. It is also critical to monitor how the recipient of the data uses it, which should strictly be as per the organizational guidelines. It is a best practice to share appropriate instructions with the recipient of data to ensure they are aware of the purpose with which data is being shared with them and how they are supposed to use and handle it. Any misuse of data must be identified and reported promptly to the appropriate person to minimise any damage arising out of data misuse.

These days most organizations require their employees and business partners or associated third parties to sign and accept the relevant agreement on the non-disclosure of business-sensitive information. In simple terms, business-sensitive information is confidential information. It is proprietary business information collected or created during the course of conducting business, including information about the business, e.g. proposed investments, intellectual property, trade secrets, or plans for a merger and information related to its clients. Business-sensitive information may sometimes also include information regarding a business's competitors in an industry.

The release of business-sensitive information to competitors or the general public poses a risk to a business. For example, information regarding plans for a merger could be harmful to a business if a competitor gets access to it.

6.2.8 Reporting Issues at Work

Most organizations have defined guidelines on appropriate reporting processes to be followed for reporting different types of issues. For example – one can report any grievances or dissatisfaction concerning co-workers to their manager/supervisor, e.g. data breaches or unethical conduct. If the concern is not addressed, then the employee should follow the organizational guidelines and hierarchy for the escalation of such issues that are not addressed appropriately.

For example – any concern related to sexual harassment at the workplace should be escalated to the concerned spokesperson, such as Human Resources (HR) representative, and if not satisfied with the action taken, it should be reported to the senior management for their consideration and prompt action.

6.2.9 Dealing with Heightened Emotions

Humans are emotional beings. There may be occasions when one is overwhelmed by emotions and is unable to suppress them. However, there may be situations when one must manage emotions well, particularly at work.

Stress in one's personal and professional life may often cause emotional outbursts at work. Managing one's emotions well, particularly the negative ones, is often seen as a measure of one's professionalism. Anger, dislike, frustration, worry, and unhappiness are the most common negative emotions experienced at work.

Ways to manage negative emotions at work:

• Compartmentalisation – It's about not confining emotions to different aspects of one's life. For example, not letting negative emotions from personal life affect work-life and vice versa. One should try to leave personal matters and issues at home. One should train their mind to let go of personal matters before reaching work. Similarly, one can compartmentalise work-related stresses so that negative emotions from work don't affect one's personal life.

- Deep breathing and relaxation Deep breathing helps with anxiety, worry, frustration and anger. One should take deep breaths, slowly count to ten inhaling and exhaling until one calms down. One can also take a walk to calm down or listen to relaxing music. Talking to someone and sharing concerns also helps one calm down.
- The 10-second rule This is particularly helpful in controlling anger and frustration. When one feels their temper rising, they should count to 10 to calm down and recompose. If possible, one should move away to allow temper to come down.
- **Clarify** It is always good to clarify before reacting, as it may be a simple case of misunderstanding or miscommunication.
- **Physical activity** Instead of losing temper, one should plan to exercise, such as running or going to the gym, to let the anger out. Exercise is also a great way to enhance mood and release any physical tension in the body.
- **Practising restraint** One should avoid replying or making a decision when angry, not allowing anger or unhappiness to cloud one's judgement. It may be best to pause any communication while one is angry, e.g. not communicating over email when angry or upset.
- **Knowing one's triggers** It helps when one is able to recognise what upsets or angers them. This way, one can prepare to remain calm and plan their reaction should a situation occur. One may even be able to anticipate the other party's reaction.
- **Be respectful** One should treat their colleagues the same way one would like to be treated. If the other person is rude, one need not reciprocate. It is possible to stay gracious, firm and assertive without being aggressive. Sometimes, rude people back away when they don't get a reaction from the person they are arguing with.
- Apologise for any emotional outburst Sometimes, one can get overwhelmed by emotions, reacting with an emotional outburst. In such a case, one should accept responsibility and apologise immediately to the affected persons without being defensive.
- Doing away with negative emotions It is recommended to let go of anger, frustration and unhappiness at the end of every workday. Harbouring negative emotions affects one emotionally, affecting their job performance also. Engaging in enjoyable activities after work is a good stress reliever.

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UNIT 6.3: Maintaining Social Diversity at Work

Unit Objectives ©



By the end of this unit, participants will be able to:

- 1. Explain the concept and importance of gender sensitivity and equality.
- 2. Discuss ways to create sensitivityfor different genders and Persons with h Disabiliti(PwD).

6.3.1 Gender Sensitivity -

Gender sensitivity is the act of being sensitive towards people and their thoughts regarding gender. It ensures that people know the accurate meaning of gender equality, and one's gender should not be given priority over their capabilities.



Fig 6.3.1 Gender Equality

Women are an important source of labour in many sectors, yet they have limited access to resources and benefits. Women should receive the same benefits and access to resources as men. A business can improve its productivity and quality of work by providing better support and opportunities to women.

Important Terms

- Gender Sensitivity- Gender sensitivity is the act of being sensitive to the ways people think about
- · Gender Equality It means persons of any gender enjoy equal opportunities, responsibilities, and rights in all areas of life.
- Gender Discrimination It means treating an individual unequally or disadvantageously based on their gender, e.g. paying different wages to men and women for similar or equal job positions.

Strategies for Enhancing Gender Equity

To enhance gender equity, one should:

- Follow gender-neutral practices at all levels at work.
- Participate together in decision-making.
- Help in promoting women's participation in different forums.
- Assist women in getting exposure to relevant skills and practices.
- · Assist women in capacity building by mentoring, coaching or motivating them, as appropriate.
- Assist in the formation and operation of women support groups.
- Assist in the implementation of women-centric programmes.
- Combine technical training with reproductive health and nutrition for coffee farming households.
- · Assist in making a work environment that is healthy, safe, and free from discrimination.

Bridging Gender Differences

Men and women react and communicate very differently. Thus, there are some work differences as both genders have their style and method of handling a situation.

Although, understanding and maturity vary from person to person, even between these genders, based on their knowledge, education, experience, culture, age, and upbringing, as well as how one's brain functions over a thought or problem.

In order to bridge the gap, one should:

- Not categorize all men and women in one way.
- Be aware of the verbal and non-verbal styles of communication of every gender to avoid any miscommunication and work better.
- Be aware of partial behaviour and avoid it.
- Encourage co-workers of different genders to make room by providing space to others.

Ways to reduce Gender Discrimination

- · Effective steps against sexual harassment by the concerned authorities and general public.
- Gender stereotypes are how society expects people to act based on their gender. This can only be reduced by adopting appropriate behaviour and the right attitude.
- Objectification of females must be abolished.

Ways to Promote Gender Sensitivity in the Workplace

Practices that promote gender diversity should be adopted and promoted.

- All genders should receive equal responsibilities, rights, and privileges.
- All genders should have equal pay for similar or the same job roles/ positions.
- · Strict and effective workplace harassment policies should be developed and implemented.
- An open-minded and stress-free work environment should be available to all the employees, irrespective of their gender.
- Women should be encouraged to go ahead in every field of work and assume leadership roles.
- Follow appropriate measures for women's empowerment.
- Men should be taught to be sensitive to women and mindful of their rights.

6.3.2 PwD Sensitivity -

Some individuals are born with a disability, while others may become disabled due to an accident, illness or as they get old. People with Disabilities (PwD) may have one or more areas in which their functioning is affected. A disability can affect hearing, sight, communication, breathing, understanding, mobility, balance, and concentration or may include the loss of a limb. A disability may contribute to how a person feels and affect their mental health

Important Terms

•Persons with Disabilities (PwD) – Persons with Disabilities means a person suffering from not less than 40% of any disability as certified by a medical authority.

·Types of Disability:

- a. Blindness Visually impaired
- b. Low Vision
- c. Leprosy Cured
- d. Hearing impairment
- e. Locomotor disability
- f. Mental retardation
- g. Mental illness

PwD Sensitivity

PwD sensitivity promotes empathy, etiquette and equal participation of individuals and organizations while working with individuals with a disability, e.g. sensory, physical or intellectual.

Ways to be PwD Sensitive

To be sensitive to PwD, one should:

- Be respectful to all Persons with Disabilities (PwD) and communicate in a way that reflects PwD sensitivity.
- Always be supportive and kind towards a PwD with their daily chores.
- Be ready to assist a PwD to help them avail of any benefit/ livelihood opportunity/ training or any kind that helps them grow.
- Encourage and try to make things easier and accessible to PwD so that they can work without or with minimum help.
- Protest where feasible and report any wrong act/behaviour against any PwD to the appropriate authority.
- Learn and follow the laws, acts, and policies relevant to PwD.

Appropriate Verbal Communication

As part of appropriate verbal communication with all genders and PwD, one should:

- Talk to all genders and PwD respectfully, maintaining a normal tone of voice with appropriate
 politeness. It is important to ensure one's tone of voice does not have hints of sarcasm, anger, or
 unwelcome affection.
- Avoid being too self-conscious concerning the words to use while also ensuring not to use words that imply one's superiority over the other.
- Make no difference between a PwD and their caretaker. Treat PwD like adults and talk to them directly.
- Ask a PwD if they need any assistance instead of assuming they need it and offering assistance spontaneously.

Appropriate Non-verbal Communication

Non-verbal communication is essentially the way someone communicates through their body language. These include:

- Facial expressions The human face is quite expressive, capable of conveying many emotions without using words. Facial expressions must usually be maintained neutral and should change according to the situation, e.g. smile as a gesture of greeting.
- Body posture and movement One should be mindful of how to sit, stand, walk, or hold their head. For example one should sit and walk straight in a composed manner. The way one moves and carries self, communicates a lot to others. This type of non-verbal communication includes one's posture, bearing, stance, and subtle movements.

- Gestures One should be very careful with their gestures, e.g. waving, pointing, beckoning, or using
 one's hands while speaking. One should use appropriate and positive gestures to maintain respect
 for the other person while being aware that a gesture may have different meanings in different
 cultures.
- Eye contact Eye contact is particularly significant in non-verbal communication. The way someone looks at someone else may communicate many things, such as interest, hostility, affection or attraction. Eye contact is vital for maintaining the flow of conversation and for understanding the other person's interest and response. One should maintain appropriate eye contact, ensuring not to stare or look over the shoulders. To maintain respect, one should sit or stand at the other person's eye level to make eye contact.
- **Touch** Touch is a very sensitive type of non-verbal communication. Examples are handshakes, hugs, pat on the back or head, gripping the arm, etc. A firm handshake indicates interest, while a weak handshake indicates the opposite. One should be extra cautious not to touch others inappropriately and avoid touching them inadvertently by maintaining a safe distance.

Rights of PwD

PwD have the right to respect and human dignity. Irrespective of the nature and seriousness of their disabilities, PwD have the same fundamental rights as others, such as:

- Disabled persons have the same civil and political rights as other people
- Disabled persons are entitled to the measures designed to enable them to become as selfdependent as possible
- Disabled persons have the right to economic and social security
- Disabled persons have the right to live with their families or foster parents and participate in all social and creative activities.
- Disabled persons are protected against all exploitation and treatment of discriminatory and abusive nature.

Making Workplace PwD Friendly

- One should not make PwD feel uncomfortable by giving too little or too much attention
- One should use a normal tone while communicating with a PwD and treat them as all others keeping in mind their limitations and type of disability
- Any help should be provided only when asked for by a PwD
- One should help in ensuring the health and well-being of PwD.

Expected Employer Behaviour

Some of the common behavioural traits that employees expect from their employers are:

- Cooperation: No work is successful without cooperation from the employer's side. Cooperation helps to understand the job role better and complete it within the given timeline.
- Polite language: Polite language is always welcomed at work. This is a basic aspect that everybody
 expects.
- Positive Attitude: Employers with a positive attitude can supervise the work of the employees and act as a helping hand to accomplish the given task. A person with a positive attitude looks at the best qualities in others and helps them gain success.
- Unbiased behaviour: Employers should always remain fair towards all their employees. One should not adopt practices to favour one employee while neglecting or ignoring the other. This might create animosity among co-workers.
- Decent behaviour: The employer should never improperly present oneself before the employee. One should always respect each other's presence and behave accordingly. The employer should not speak or act in a manner that may make the employee feel uneasy, insulted, and insecure.

Exercise 🔀

- 1. List down three examples of workplace ethics.
- 2. List down three examples of interpersonal skills.
- 3. Identify two reasons for workplace conflicts.
- 4. Identify two ways of resolving interpersonal conflicts
- 5. List down two ways of dealing with heightened emotions at work.
- 6. List down two types of non-verbal communication.

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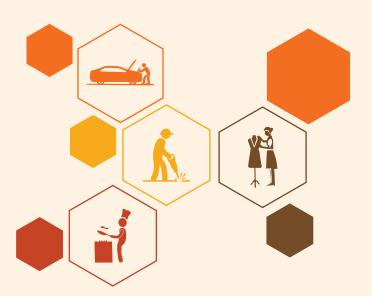
7. Basic Health and Safety Practices

Unit 7.1 - Workplace Hazards

Unit 7.2 - Fire Safety

Unit 7.3 - First Aid

Unit 7.4 - Waste Management



Key Learning Outcomes



By the end of this module, participa ts will be able to:

- 1. Discuss job-site hazards, risks and accidents
- 2. Explain the organizational safety procedures for maintaining electrical safety, handling tools and hazardous materials
- 3. Describe how to interpret warning signs while accessing sensitive work areas
- 4. Explain the importance of good housekeeping
- 5. Describe the importance of maintaining appropriate postures while lifting heavy objects
- 6. List the types of fire and fire extinguishers
- 7. Describe the concept of waste management and methods of disposing of hazardous waste
- 8. List the common sources of pollution and ways to minimize them
- 9. Elaborate on electronic waste disposal procedures
- 10. Explain how the administer appropriate first aid to victims in case of bleeding, burns, choking, electric shock, poisoning and also administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock

UNIT 7.1: Workplace Hazards

Unit Objectives ©



By the end of this unit, participants will be able to:

- Discuss job-site hazards, risks and accidents
- Explain the organizational safety procedures for maintaining electrical safety, handling tools and hazardous materials
- Describe how to interpret warning signs while accessing sensitive work areas
- Explain the importance of good housekeeping
- Describe the importance of maintaining appropriate postures while lifting heavy objects
- Explain safe handling of tools and Personal Protective Equipment to be used.

7.1.1 Workplace Safety ———

Workplace safety is important to be established for creating a safe and secure working for the workers. The workplace has to be administered as per the rules of the Occupational Safety and Health Administration (OSHA). It refers to monitoring the working environment and all hazardous factors that impact employees' safety, health, and well-being. It is important to provide a safe working environment to the employees to increase their productivity, wellness, skills, etc.

The benefits of workplace safety are:

- Employee retention increases if they are provided with a safe working environment.
- · Failure to follow OSHA's laws and guidelines can result in significant legal and financial consequences.
- A safe environment enables employees to stay invested in their work and increases productivity.
- Employer branding and company reputation can both benefit from a safe working environment.

7.1.2 Workplace Hazards —

A workplace is a situation that has the potential to cause harm or injury to the workers and damage the tools or property of the workplace. Hazards exist in every workplace and can come from a variety of sources. Finding and removing them is an important component of making a safe workplace.

Common Workplace Hazards

The common workplace hazards are:

·Biological: The threats caused by biological agents like viruses, bacteria, animals, plants, insects and also humans, are known as biological hazards.

- **Chemical:** Chemical hazard is the hazard of inhaling various chemicals, liquids and solvents. Skin irritation, respiratory system irritation, blindness, corrosion, and explosions are all possible health and physical consequences of these dangers.
- **Mechanical:** Mechanical Hazards comprise the injuries that can be caused by the moving parts of machinery, plant or equipment.
- **Psychological:** Psychological hazards are occupational hazards caused by stress, harassment, and violence.
- **Physical:** The threats that can cause physical damage to people is called physical hazard. These include unsafe conditions that can cause injury, illness and death.
- **Ergonomic:** Ergonomic Hazards are the hazards of the workplace caused due to awkward posture, forceful motion, stationary position, direct pressure, vibration, extreme temperature, noise, work stress, etc.

Workplace Hazards Analysis

A workplace hazard analysis is a method of identifying risks before they occur by focusing on occupational tasks. It focuses on the worker's relationship with the task, the tools, and the work environment. After identifying the hazards of the workplace, organisations shall try to eliminate or minimize them to an acceptable level of risk.

Control Measures of Workplace Hazards

Control measures are actions that can be taken to reduce the risk of being exposed to the hazard. Elimination, Substitution, Engineering Controls, Administrative Controls, and Personal Protective Equipment are the five general categories of control measures.

- **Elimination:** The most successful control technique is to eliminate a specific hazard or hazardous work procedure or prevent it from entering the workplace.
- **Substitution:** Substitution is the process of replacing something harmful with something less hazardous. While substituting the hazard may not eliminate all of the risks associated with the process or activity, it will reduce the overall harm or health impacts.
- **Engineering Controls:** Engineered controls protect workers by eliminating hazardous situations or creating a barrier between the worker and the hazard, or removing the hazard from the person.
- Administrative Controls: To reduce exposure to hazards, administrative controls limit the length of
 time spent working on a hazardous task that might be used in combination with other measures of
 control.
- **Personal Protective Equipment:** Personal protective equipment protects users from health and safety hazards at work. It includes items like safety helmets, gloves, eye protection, etc.

7.1.3 Risk for a Drone Technician

A drone technician may require to repair the propeller, motor and its mount, battery, mainboards, processor, booms, avionics, camera, sensors, chassis, wiring and landing gear. A technician may face some risks while repairing the drones' equipment.

- The technician is susceptible to being physically harmed by propellers.
- Direct contact with exposed electrical circuits can injure the person.
- If the skin gets in touch with the heat generated from electric arcs, it burns the internal tissues.
- Major electrical injuries can occur due to poorly installed electrical equipment, faulty wiring, overloaded or overheated outlets, use of extension cables, incorrect use of replacement fuses, use of equipment with wet hands, etc.

7.1.4 Workplace Warning Signs

A Hazard sign is defined as 'information or instruction about health and safety at work on a signboard, an illuminated sign or sound signal, a verbal communication or hand signal.'

There are four different types of safety signs:

- · Prohibition / Danger Alarm Signs
- Mandatory Signs
- Warning Signs
- And Emergency
- **1. Prohibition Signs:** A "prohibition sign" is a safety sign that prohibits behaviour that is likely to endanger one's health or safety. The colour red is necessary for these health and safety signs. Only what or who is forbidden should be displayed on a restriction sign.



Fig. 7.1.1. Prohibition arning Signs

2. Mandatory Signs:

Mandatory signs give clear directions that must be followed. The icons are white circles that have been reversed out of a blue circle. On a white background, the text is black.



Fig. 7.1.2. Mandatory Signs

3. Warning Signs

Warning signs are the safety information communicatiosigns. They are shown as a 'yellow colour triangle'.



Fig. 7.1.3. Warning Signs

4. Emergency Signs

The locationor routes to emergency ffacilitieare indicated by emergency signs. These signs have a green backdrop with a white emblem or writing. These signs convey basic informatioand frequently refer to housekeeping, company procedures, or logistics.

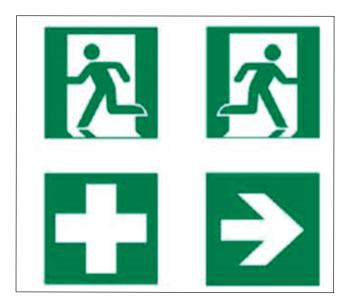


Fig. 7.1.4. Emergency Signs

7.1.5 Cleanliness in the Workplace

Workplace cleanliness maintenance creates a healthy, efficient and productive environment for the employees. Cleanliness at the workplace is hindered by some elements like cluttered desks, leftover food, waste paper, etc. A tidy workplace is said to improve employee professionalism and enthusiasm while also encouraging a healthy working environment.

Benefits of cleanliness in the workplace:

- 1. Productivity: Cleanliness in the workplace can bring a sense of belonging to the employees, also motivating and boosting the morale of the employees. This results in increasing their productivity.
- Employee Well-being: Employee well-being can be improved by providing a clean work environment. Employees use fewer sick days in a workplace where litter and waste are properly disposed of, and surfaces are cleaned regularly, resulting in increased overall productivity.
- 3. Positive Impression: Cleanliness and orderliness in the workplace provide a positive impression on both employees and visitors.
- 4. Cost saving: By maintaining acceptable levels of cleanliness in the workplace, businesses can save money on cleaning bills and renovations, which may become necessary if the premises are not properly kept.

Reasons for Cleaning the Workplace

- Cleaning of dry floors, mostly to prevent workplace slips and falls.
- Disinfectants stop bacteria in their tracks, preventing the spread of infections and illness.
- Proper air filtration decreases hazardous substance exposures such as dust and fumes.
- Light fixture cleaning improves lighting efficiency.
- Using environmentally friendly cleaning chemicals that are safer for both personnel and the environment.
- Work environments are kept clean by properly disposing of garbage and recyclable items.

7.1.6 Lifting and Handling of Heavy Loads

Musculoskeletal Injuries (MSIs), such as sprains and strains, can occur while lifting, handling, or carrying objects at work. When bending, twisting, uncomfortable postures and lifting heavy objects are involved, the risk of injury increases. Ergonomic controls can help to lower the risk of injury and potentially prevent it.

Types of injuries caused while lifting heavy objects:

- Cuts and abrasions are caused by rough surfaces.
- Crushing of feet or hands.
- Strain to muscles and joints

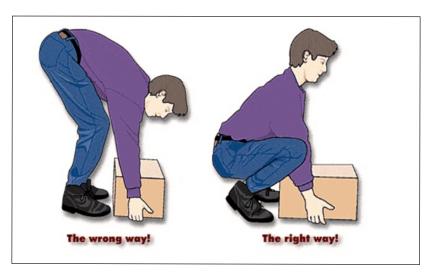


Fig. 7.1.5. Lifting loads echnique

Preparing to lift

A load that appears light enough to bear at first will grow increasingly heavier as one carries it further. The person carrying the weight should be able to see over or around it at all times.

The amount of weight a person can lift, depends on their age, physique, and health

It also depends on whether or not the person is used to lifting and moving hefty objects.

Common Causes of Back Injuries

The Most Common Causes of Back Injuries are:

- 1) Inadequate Training: The individual raising the load receives no sufficient training or guidance.
- **2)** Lack of awareness of technique: The most common cause of back pain is incorrect twisting and posture, which causes back strain.
- **3)** Load size: The load size to consider before lifting. If the burden is too much for one's capacity or handling, their back may be strained and damaged.
- **4) Physical Strength:** Depending on their muscle power, various persons have varied physical strengths. One must be aware of their limitations.
- **5) Teamwork:** The operation of a workplace is all about working together. When opposed to a single person lifting a load, two people can lift it more easily and without difficulty. If one of two people isn't lifting it properly, the other or both of them will suffer back injuries as a result of the extra strain.

Techniques for Lifting Heavy Objects

Tec	hnique	Demonstraton
1.	Ensure one has a wide base of support before lifting the heavy object. Ensure one's feet are shoulder-width apart, and one foot is slightly ahead of the other at all times. This will help one maintain a good balance during the lifting of heavy objects. This is known as the Karate Stance.	
2.	Squat down as near to the object as possible when one is ready to lift it, bending at the hips and knees with the buttocks out. If the object is really heavy, one may wish to place one leg on the floor and the other bent at a straight angle in front of them.	

3. Maintain proper posture as one begin to lift upward. To do so, one should keep their back straight, chest out, and shoulders back while gazing straight ahead.



4. By straightening one's hips and knees, slowly elevate the thing (not the back). As one rises, they should extend their legs and exhale. Lift the heavy object without twisting the body or bending forward.



5. Do not lift bending forward.



6. Hold the load close to the body.



7. Never lift heavy objects above the shoulder



8. Use the feet (not the body) to change direction, taking slow, small steps.



9. Set down the heavy object carefully, squatting with the knees and hips only.



Table 7.1.1 Techniques for lifting he vy objects

7.1.7 Safe Handling of Tools

Workers should be trained on how to use tools safely. When tools are misplaced or handled incorrectly by workers, they can be dangerous. The following are some suggestions from the National Safety Council for safe tool handling when they are not in use:

- Never carry tools up or down a ladder in a way that makes it difficult to grip them. Instead of being carried by the worker, tools should be lifted up and down using a bucket or strong bag.
- Tools should never be tossed but should be properly passed from one employee to the next. Pointed tools should be passed with the handles facing the receiver or in their carrier.
- When turning and moving around the workplace, workers carrying large tools or equipment on their shoulders should pay particular attention to clearances.
- Pointed tools such as chisels and screwdrivers should never be kept in a worker's pocket. They can be
 carried in a toolbox, pointing down in a tool belt or pocket tool bag, or in hand with the tip always
 held away from the body.
- Tools should always be stored while not in use. People below are put in danger when tools are left sitting around on an elevated structure, such as a scaffold. In situations when there is a lot of vibration, this risk increases.

³Source:https://ww .braceability.ccom/blogs/articles/7-prop-heavavy-liftinechniques

7.1.8 Personal Protective Equipment

Personal protective equipment, or "PPE," is equipment worn to reduce exposure to risks that might result in significant occupational injuries or illnesses. Chemical, radiological, physical, electrical, mechanical, and other job dangers may cause these injuries and diseases.

PPE used for protection fom the following injuries are:

Injury Protecton	Protecton	PPE
Head Injury Protecton	Falling or flying objects, stationary objects, or contact with electrical wires can cause impact, penetration, and electrical injuries. Hard hats can protect one's head from these injuries. A common electrician's hard hat is shown in the figure below. This hard hat is made of nonconductive plastic and comes with a set of safety goggles.	
Foot and Leg Injury Protecton	In addition to foot protection and safety shoes, leggings (e.g., leather) can guard against risks such as falling or rolling objects, sharp objects, wet and slippery surfaces, molten metals, hot surfaces, and electrical hazards.	
Eye and Face Injury Protecton	Spectacles, goggles, special helmets or shields, and spectacles with side shields and face shields can protect against the hazards of flying fragments, large chips, hot sparks, radiation, and splashes from molten metals. They also offer protection from particles, sand, dirt, mists, dust, and glare.	



Table 7.1.2. Personal protective equipment

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UNIT 7.2: Fire Safety

Unit Objectives ©



By the end of this unit, participants will be able to:

1. List the types of fire and fire e extinguiss.

7.2.1 Fire Safety —

Fire safety is a set of actions aimed at reducing the amount of damage caused by fire. Fire safety procedures include both those that are used to prevent an uncontrolled fire from starting and those that are used to minimise the spread and impact of a fire after it has started. Developing and implementing fire safety measures in the workplace is not only mandated by law but is also essential for the protection of everyone who may be present in the building during a fire emergency.

The basic Fire Safety Responsibilities are:

- To identify risks on the premises, a fire risk assessment must be carried out.
- Ascertain that fire safety measures are properly installed.
- Prepare for unexpected events.
- Fire safety instructions and training should be provided to the employees.

7.2.2 Respond to a Workplace Fire

- Workplace fire drills should be conducted on a regular basis.
- If one has a manual alarm, they should raise it.
- Close the doors and leave the fire-stricken area as soon as possible. Ensure that the evacuation is quick and painless.
- Turn off dangerous machines and don't stop to get personal items.
- · Assemble at a central location. Ascertain that the assembly point is easily accessible to the employees.
- If one's clothing catches fire, one shouldn't rush about it. They should stop and descend on the ground and roll to smother the flames if their clothes catch fire.

7.2.3 Fire Extinguisher -

Fire extinguishers are portable devices used to put out small flames or minimise their damage until fire-fighters arrive. These are maintained on hand in locations such as fire stations, buildings, workplaces, public transit, and so on. The types and quantity of extinguishers that are legally necessary for a given region are determined by the applicable safety standards.

Types of fire extinguishers are:

There are five main types of fire extinguishers:

- 1. Water.
- 2. Powder.
- 3. Foam.
- 4. Carbon Dioxide (CO2).
- 5. Wet chemical.
- **1. Water:** Water fire extinguishers are one of the most common commercial and residential fire extinguishers on the market. They're meant to be used on class-A flames.



2. Powder: The L2 powder fire extinguisher is the most commonly recommended fire extinguisher in the Class D Specialist Powder category, and is designed to put out burning lithium metal fires.



3. Foam: Foam extinguishers are identified by a cream rectangle with the word "foam" printed on it. They're mostly water-based, but they also contain a foaming component that provides a quick knock-down and blanketing effect on flames. It suffocates the flames and seals the vapours, preventing re-ignition.



4. Carbon Dioxide (CO2): Class B and electrical fires are extinguished with carbon dioxide extinguishers, which suffocate the flames by removing oxygen from the air. They are particularly beneficial for workplaces and workshops where electrical fires may occur since, unlike conventional extinguishers, they do not leave any toxins behind and hence minimise equipment damage.



5. Wet Chemical: Wet chemical extinguishers are designed to put out fires that are classified as class F. They are successful because they can put out extremely high-temperature fires, such as those caused by cooking oils and fats.



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UNIT 7.3: First Aid

Unit Objectives 6



By the end of this unit, participants will be able to:

- 1. Explain how the administer appropriate first aid to victims in case of bleeding, burns, choking, electric shock, poisoning
- 2. Explain how to administer first aid to victims in case of a heart attack or cardiac arrest due to electric shock.

7.3.1 First Aid ———

First aid is the treatment or care given to someone who has sustained an injury or disease until more advanced care can be obtained or the person recovers.

The aim of first aid is to:

- · Preserve life
- · Prevent the worsening of a sickness or injury
- · If at all possible, relieve pain
- Encourage recovery
- · Keep the unconscious safe.

First aid can help to lessen the severity of an injury or disease, and in some situations, it can even save a person's life.

7.3.2 Need for First Aid at the Workplace —

- In the workplace, first aid refers to providing immediate care and life support to persons who have been injured or become unwell at work.
- Many times, first aid can help to lessen the severity of an accident or disease.
- It can also help an injured or sick person relax. In life-or-death situations, prompt and appropriate first aid can make all the difference.

7.3.2 Need for First Aid at the Workplace

In the workplace, first aid refers to providing immediate care and life support to persons who have been injured or become unwell at work.

Many times, first aid can help to lessen the severity of an accident or disease.

It can also help an injured or sick person relax. In life-or-death situations, prompt and appropriate first aid can make all the difference.

7.3.3 Treating Minor Cuts and Scapes

Steps to keep cuts clean and prevent infectionsand scars:

- Wash Hands: Wash hands first with soap and water to avoid introducing bacteria into the cut and causing an infection. One should use the hand sanitiser if one is on the go.
- **Stop the bleeding:** Using a gauze pad or a clean towel, apply pressure to the wound. For a few minutes, keep the pressure on.
- Clean Wounds: Once the bleeding has stopped, clean the wound by rinsing it under cool running water or using a saline wound wash. Use soap and a moist washcloth to clean the area around the wound. Soap should not be used on the cut since it may irritate the skin. Also, avoid using hydrogen peroxide or iodine, as these may aggravate the wound.
- **Remove Dirt:** Remove any dirt or debris from the area. Pick out any dirt, gravel, glass, or other material in the cut with a pair of tweezers cleaned with alcohol.

7.3.4 Heart Atack

When the blood flow carrying oxygen to the heart is blocked, a heart attack occurs. The heart muscle runs out of oxygen and starts to die.

Symptoms of a heart attack can vary from person to person. They may be mild or severe. Women, older adults, and people with diabetes are more likely to have subtle or unusual symptoms.

Symptoms in adults may include:

- Changes in mental status, especially in older adults.
- Chest pain that feels like pressure, squeezing, or fullness. The pain is most often in the centre of the chest. It may also be felt in the jaw, shoulder, arms, back, and stomach. It can last for more than a few minutes or come and go.
- · Cold sweat.
- Light-headedness.
- · Nausea (more common in women).
- · Indigestion.

- Vomiting.
- Numbness, aching or tingling in the arm (usually the left arm, but the right arm may be affected alone, or along with the left).
- Shortness of breath
- Weakness or fatigue, especially in older adults and in women.

First Aid for Heart Attack

If one thinks someone is experiencing a heart attack, they should:

- Have the person sit down, rest, and try to keep calm.
- Loosen any tight clothing.
- Ask if the person takes any chest pain medicine, such as nitro-glycerine for a known heart condition, and help them take it.
- If the pain does not go away promptly with rest or within 3 minutes of taking nitro-glycerine, call for emergency medical help.
- If the person is unconscious and unresponsive, call 911 or the local emergency number, then begin CPR.
- If an infant or child is unconscious and unresponsive, perform 1 minute of CPR, then call 911 or the local emergency number.

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UNIT 7.4: Waste Management

Unit Objectives S



By the end of this unit, participants will be able to:

- 1. Describe the concept of waste management and methods of disposing of hazardous waste.
- 2. List the common sources of pollutionand ways to minimize them.
- 3. Elaborate on electronic waste disposal procedures.

7.4.1. Waste Management and Methods of Waste Disposal -

The collection, disposal, monitoring, and processing of waste materials is known as waste management. These wastes affect living beings' health and the environment. For reducing their effects, they have to be managed properly. The waste is usually in solid, liquid or gaseous form.

The importance of waste management is:

Waste management is important because it decreases waste's impact on the environment, health, and other factors. It can also assist in the reuse or recycling of resources like paper, cans, and glass. The disposal of solid, liquid, gaseous, or dangerous substances is the example of waste management.

When it comes to trash management, there are numerous factors to consider, including waste disposal, recycling, waste avoidance and reduction, and garbage transportation. Treatment of solid and liquid wastes is part of the waste management process. It also provides a number of recycling options for goods that aren't classified as garbage during the process.

7.4.2 Methods of Waste Management

Non-biodegradable and toxic wastes, such as radioactive remains, can cause irreversible damage to the environment and human health if they are not properly disposed of. Waste disposal has long been a source of worry, with population increase and industrialisation being the primary causes. Here are a few garbage disposal options.

- 1. Landfills: The most common way of trash disposal today is to throw daily waste/garbage into landfills. This garbage disposal method relies on burying the material in the ground.
- 2. Recycling: Recycling is the process of transforming waste items into new products in order to reduce energy consumption and the use of fresh raw materials. Recycling reduces energy consumption, landfill volume, air and water pollution, greenhouse gas emissions, and the preservation of natural resources for future use.

- **3. Composting:** Composting is a simple and natural bio-degradation process that converts organic wastes, such as plant remnants, garden garbage, and kitchen waste, into nutrient-rich food for plants.
- **4. Incineration:** Incineration is the process of combusting garbage. The waste material is cooked to extremely high temperatures and turned into materials such as heat, gas, steam, and ash using this technology.

7.4.3 Recyclable, Non-Recyclable and Hazardous Waste

- 1. Recyclable Waste: The waste which can be reused or recycled further is known as recyclable waste.
- **2. Non-recyclable Waste:** The waste which cannot be reused or recycled is known as non-recyclable waste. Polythene bags are a great example of non-recyclable waste.
- **3. Hazardous Waste:** The waste which can create serious harm to the people and the environment is known as hazardous waste.

7.4.4 Sources of Pollution -

Pollution is defined as the harm caused by the presence of a material or substances in places where they would not normally be found or at levels greater than normal. Polluting substances might be in the form of a solid, a liquid, or a gas.

- **Point source of pollution:** Pollution from a point source enters a water body at a precise location and can usually be identified. Effluent discharges from sewage treatment plants and industrial sites, power plants, landfill sites, fish farms, and oil leakage via a pipeline from industrial sites are all potential point sources of contamination.
 - Point source pollution is often easy to prevent since it is feasible to identify where it originates, and once identified, individuals responsible for the pollution can take rapid corrective action or invest in longer-term treatment and control facilities.
- **Diffuse source of pollution:** As a result of land-use activities such as urban development, amenity, farming, and forestry, diffuse pollution occurs when pollutants are widely used and diffused over a large region. These activities could have occurred recently or in the past. It might be difficult to pinpoint specific sources of pollution and, as a result, take rapid action to prevent it because prevention often necessitates significant changes in land use and management methods.

Pollution Prevention

Pollution prevention entails acting at the source of pollutants to prevent or minimise their production. It saves natural resources, like water, by using materials and energy more efficiently.

Pollution prevention includes any practice that:

- Reduces the amount of any hazardous substance, pollutant, or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment, or disposal;
- Reduces the hazards to public health and the environment associated with the release of such substances, pollutants, or contaminants (these practices are known as "source reduction");
- Improved efficiency in the use of raw materials, energy, water, or other resources, or Conservation is a method of safeguarding natural resources.
- Improvements in housekeeping, maintenance, training, or inventory management; equipment or technology adjustments; process or method modifications; product reformulation or redesign; raw material substitution; or improvements in housekeeping, maintenance, training, or inventory control.

7.4.5 Electronic Waste

Lead, cadmium, beryllium, mercury, and brominated flame retardants are found in every piece of electronic waste. When gadgets and devices are disposed of illegally, these hazardous compounds are more likely to contaminate the earth, pollute the air, and leak into water bodies.

When e-waste is dumped in a landfill, it tends to leach trace metals as water runs through it. The contaminated landfill water then reaches natural groundwater with elevated toxic levels, which can be dangerous if it reaches any drinking water bodies. Despite having an environmentally benign approach, recycling generally results in international shipment and dumping of the gadgets in pits.

Some eco-friendly ways of disposing of e-waste are:

- · Giving back the e-waste to the electronic companies and drop-off points
- · Following guidelines issued by the government
- · Selling or donating the outdated technology-based equipment
- · Giving e-waste to a certified e-waste recycler

Exercise	0
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1. Na	ame all five types of fire extinguishers.
2. Ex	plain PPE in brief.
3. Lis	st the common workplace hazards.
4. Fil	l in the blacks:
i.	A " sign" is a safety sign that prohibits behaviour that is likely to endanger one's health or safety.
ii.	entails acting at the source of pollutants to prevent or minimise their production.
iii.	is the treatment or care given to someone who has sustained an injury or disease until more advanced care can be obtained or the person recovers.
iv.	The threats caused by biological agents like viruses, bacteria, animals, plants, insects and also humans, are known as

v. The workplace has to be administered as per the rules of the ______.

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8. Employability & Entrepreneurship Skills

Unit 8.1 – Personal Strengths & Value Systems

Unit 8.2 – Digital Literacy: A Recap

Unit 8.3 – Money Matters

Unit 8.4 – Preparing for Employment & Self-Employment

Unit 8.5 – Understanding Entrepreneurship

Unit 8.6 – Preparing to be an Entrepreneur



Key Learning Outcomes

At the end of this module, you will be able to:

- 1. Explain the meaning of health
- 2. List common health issues
- 3. Discuss tips to prevent common health issues
- 4. Explain the meaning of hygiene
- 5. Discuss the purpose of Swacch Bharat Abhiyan
- 6. Explain the meaning of habit
- 7. Discuss ways to set up a safe work environment
- 8. Discuss critical safety habits to be followed by employees
- 9. Explain the importance of self-analysis
- 10. Discuss motivation with the help of Maslow's Hierarchy of Needs
- 11. Discuss the meaning of achievement motivation
- 12. List the characteristics of entrepreneurs with achievement motivation
- 13. List the different factors that motivate you
- 14. Discuss the role of attitude in self-analysis
- 15. Discuss how to maintain a positive attitude
- 16. List your strengths and weaknesses
- 17. Discuss the qualities of honest people
- 18. Describe the importance of honesty in entrepreneurs
- 19. Discuss the elements of a strong work ethic
- 20. Discuss how to foster a good work ethic
- 21. List the characteristics of highly creative people
- 22. List the characteristics of highly innovative people
- 23. Discuss the benefits of time management
- 24. List the traits of effective time managers
- 25. Describe effective time management technique
- 26. Discuss the importance of anger management
- 27. Describe anger management strategies
- 28. Discuss tips for anger management
- 29. Discuss the causes of stress
- 30. Discuss the symptoms of stress
- 31. Discuss tips for stress management
- 32. Identify the basic parts of a computer
- 33. Identify the basic parts of a keyboard
- 34. Recall basic computer terminology
- 35. Recall the functions of basic computer keys
- 36. Discuss the main applications of MS Office
- 37. Discuss the benefits of Microsoft Outlook
- 38. Discuss the different types of e-commerce
- 39. List the benefits of e-commerce for retailers and customers
- 40. Discuss how the Digital India campaign will help boost e-commerce in India

- 41. Describe how you will sell a product or service on an e-commerce platform
- 42. Discuss the importance of saving money
- 43. Discuss the benefits of saving money
- 44. Discuss the main types of bank accounts
- 45. Describe the process of opening a bank account
- 46. Differentiate between fixed and variable costs
- 47. Describe the main types of investment options
- 48. Describe the different types of insurance products
- 49. Describe the different types of taxes
- 50. Discuss the uses of online banking
- 51. Discuss the main types of electronic funds transfers
- 52. Discuss the steps to prepare for an interview
- 53. Discuss the steps to create an effective Resume
- 54. Discuss the most frequently asked interview questions
- 55. Discuss how to answer the most frequently asked interview questions
- 56. Discuss basic workplace terminology
- 57. Discuss the concept of entrepreneurship
- 58. Discuss the importance of entrepreneurship
- 59. Describe the characteristics of an entrepreneur
- 60. Describe the different types of enterprises
- 61. List the qualities of an effective leader
- 62. Discuss the benefits of effective leadership
- 63. List the traits of an effective team
- 64. Discuss the importance of listening effectively
- 65. Discuss how to listen effectively
- 66. Discuss the importance of speaking effectively
- 67. Discuss how to speak effectively
- 68. Discuss how to solve problems
- 69. List important problem-solving traits
- 70. Discuss ways to assess problem solving skills
- 71. Discuss the importance of negotiation
- 72. Discuss how to negotiate
- 73. Discuss how to identify new business opportunities
- 74. Discuss how to identify business opportunities within your business
- 75. Explain the meaning of entrepreneur
- 76. Describe the different types of entrepreneurs
- 77. List the characteristics of entrepreneurs
- 78. Recall entrepreneur success stories
- 79. Discuss the entrepreneurial process
- 80. Describe the entrepreneurship ecosystem
- 81. Discuss the purpose of the Make in India campaign
- 82. Discuss key schemes to promote entrepreneurs

- 83. Discuss the relationship between entrepreneurship and risk appetite
- 84. Discuss the relationship between entrepreneurship and resilience
- 85. Describe the characteristics of a resilient entrepreneur
- 86. Discuss how to deal with failure
- 87. Discuss how market research is carried out
- 88. Describe the 4 Ps of marketing
- 89. Discuss the importance of idea generation
- 90. Recall basic business terminology
- 91. Discuss the need for CRM
- 92. Discuss the benefits of CRM
- 93. Discuss the need for networking
- 94. Discuss the benefits of networking
- 95. Discuss the importance of setting goals
- 96. Differentiate between short-term, medium-term and long-term goals
- 97. Discuss how to write a business plan
- 98. Explain the financial planning process
- 99. Discuss ways to manage your risk
- 100. Describe the procedure and formalities for applying for bank finance
- 101. Discuss how to manage your own enterprise
- 102. List important questions that every entrepreneur should ask before starting an enterprise

UNIT 8.1: Personal Strengths & Value Systems

Unit Objectives 6



At the end of this unit, participant will be able to:

- 1. Explain the meaning of health
- 2. List common health issues
- 3. Discuss tips to prevent common health issues
- 4. Explain the meaning of hygiene
- 5. Discuss the purpose of Swacch Bharat Abhiyan
- 6. Explain the meaning of habit
- 7. Discuss ways to set up a safe work environment
- 8. Discuss critical safety habits to be followed by employees
- 9. Explain the importance of self-analysis
- 10. Discuss motivation with the help of Maslow's Hierarchy of Needs
- 11. Discuss the meaning of achievement motivation
- 12. List the characteristics of entrepreneurs with achievement motivation
- 13. List the different factors that motivate you
- 14. Discuss the role of attitude in self-analysis
- 15. Discuss how to maintain a positive attitude
- 16. List your strengths and weaknesses
- 17. Discuss the qualities of honest people
- 18. Describe the importance of honesty in entrepreneurs
- 19. Discuss the elements of a strong work ethic
- 20. Discuss how to foster a good work ethic
- 21. List the characteristics of highly creative people
- 22. List the characteristics of highly innovative people
- 23. Discuss the benefits of time management
- 24. List the traits of effective time managers
- 25. Describe effective time management technique
- 26. Discuss the importance of anger management
- 27. Describe anger management strategies
- 28. Discuss tips for anger management
- 29. Discuss the causes of stress
- 30. Discuss the symptoms of stress
- 31. Discuss tips for stress management

8.1.1 Health, Habits, Hygiene: What is Health?

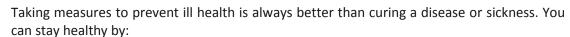
As per the World Health Organization (WHO), health is a "State of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity." This means being healthy does not simply mean not being unhealthy — it also means you need to be at peace emotionally and feel fit physically. For example, you cannot say you are healthy simply because you do not have any physical ailments like a cold or cough. You also need to think about whether you are feeling calm, relaxed and happy.

Common Health Issues

Some common health issues are:

- Allergies
- Asthma
- Skin Disorders
- Depression and Anxiety
- Diabetes
- Cough, Cold, Sore Throat
- Difficulty Sleeping
- Obesity

8.1.1.1 Tips to Prevent Health Issues



- Eating healthy foods like fruits, vegetables and nuts
- Cutting back on unhealthy and sugary foods
- Drinking enough water everyday
- Not smoking or drinking alcohol
- Exercising for at least 30 minutes a day, 4-5 times a week
- Taking vaccinations when required
- Practicing yoga exercises and meditation

How many of these health standards do you follow? Tick the ones that apply to you.		
1. Get minimum 7-8 hours of sleep every night.		
Avoid checking email first thing in the morning and right before you go to bed at night.		
3. Don't skip meals – eat regular meals at correct meal times.		
4. Read a little bit every single day.		
5. Eat more home cooked food than junk food.		
6. Stand more than you sit.		
7. Drink a glass of water first thing in the morning and have at least 8 glasses of water through the day.		
8. Go to the doctor and dentist for regular check-ups.		
9. Exercise for 30 minutes at least 5 days a week.		
10. Avoid consuming lots of aerated beverages.		

8.1.1.2 What is Hygiene?

As per the World Health Organization (WHO), "Hygiene refers to conditions and practices that help to maintain health and prevent the spread of diseases." In other words, hygiene means ensuring that you do whatever is required to keep your surroundings clean, so that you reduce the chances of spreading germs and diseases.

For instance, think about the kitchen in your home. Good hygiene means ensuring that the kitchen is always spick and span, the food is put away, dishes are washed, and dustbins are not overflowing with garbage. Doing all this will reduce the chances of attracting pests like rats or cockroaches, and prevent the growth of fungus and other bacteria, which could spread disease.

How many of these health standards do you follow? Tick the ones that apply to you.			
1.	Have a bath or shower every day with soap – and wash your hair with shampoo 2-3 times a week.		
2.	Wear a fresh pair of clean undergarments every day.		
3.	Brush your teeth in the morning and before going to bed.		
4.	Cut your fingernails and toenails regularly.		
5.	Wash your hands with soap after going to the toilet.		
6.	Use an anti-perspirant deodorant on your underarms if you sweat a lot.		
7.	Wash your hands with soap before cooking or eating.		
8.	Stay home when you are sick, so other people don't catch what you have.		
9.	Wash dirty clothes with laundry soap before wearing them again.		
10	Cover your nose with a tissue/your hand when coughing or sneezing.		
	ee how healthy and hygienic you are, by giving yourself 1 point for every ticked s hen take a look at what your score means.	tatement!	
Y	our Score		
•	0-7/20: You need to work a lot harder to stay fit and fine! Make it a point t good habits daily and see how much better you feel!	o practice	
•	• 7-14/20: Not bad, but there is scope for improvement! Try and add a few more good habits to your daily routine.		
•	• 14-20/20: Great job! Keep up the good work! Your body and mind thank you!		

-8.1.1.3 Swachh Bharat Abhiyan

We have already discussed the importance of following good hygiene and health practices for ourselves. But, it is not enough for us to be healthy and hygienic. We must also extend this standard to our homes, our immediate surroundings and to our country as a whole.

The 'Swachh Bharat Abhiyan' (Clean India Mission) launched by Prime Minister Shri Narendra Modi on 2nd October 2014, believes in doing exactly this. The aim of this mission is to clean the streets and roads of India and raise the overall level of cleanliness. Currently this mission covers 4,041 cities and towns across the country. Millions of our people have taken the pledge for a clean India. You should take the pledge too, and do everything possible to keep our country clean!

8.1.1.4 What are Habits?

A habit is a behaviour that is repeated frequently. All of us have good habits and bad habits. Keep in mind the phrase by John Dryden: "We first make our habits, and then our habits make us." This is why it is so important that you make good habits a way of life, and consciously avoid practicing bad habits.

Some good habits that you should make part of your daily routine are:

- Always having a positive attitude
- Making exercise a part of your daily routine
- Reading motivational and inspirational stories
- Smiling! Make it a habit to smile as often as possible
- Making time for family and friends
- Going to bed early and waking up early

Some bad habits that you should guit immediately are:

- Skipping breakfast
- Snacking frequently even when you are not hungry
- Eating too much fattening and sugary food
- Smoking, drinking alcohol and doing drugs
- Spending more money than you can afford
- Worrying about unimportant issues
- Staying up late and waking up late

Tips



- Following healthy and hygienic practices every day will make you feel good mentally and physically.
- Hygiene is two-thirds of health so good hygiene will help you stay strong and healthy!

8.1.2: Safety: Tips to Design a Safe Workplace

Every employer is obligated to ensure that his workplace follows the highest possible safety protocol. When setting up a business, owners must make it a point to:

- Use ergonomically designed furniture and equipment to avoid stooping and twisting
- Provide mechanical aids to avoid lifting or carrying heavy objects
- Have protective equipment on hand for hazardous jobs
- Designate emergency exits and ensure they are easily accessible
- Set down health codes and ensure they are implemented
- Follow the practice of regular safety inspections in and around the workplace
- Ensure regular building inspections are conducted
- Get expert advice on workplace safety and follow it

8.1.2.1 Negotiable Employee Safety Habits

Every employer is obligated to ensure that his workplace follows the highest possible safety protocol. When setting up a business, owners must make it a point to:

- Immediately report unsafe conditions to a supervisor
- Recognize and report safety hazards that could lead to slips, trips and falls
- Report all injuries and accidents to a supervisor
- Wear the correct protective equipment when required
- Learn how to correctly use equipment provided for safety purposes
- Be aware of and avoid actions that could endanger other people
- Take rest breaks during the day and some time off from work during the week

Tips



- Be aware of what emergency number to call at the time of a workplace emergency
- Practice evacuation drills regularly to avoid chaotic evacuations

8.1.3 Self-Analysis – Attitude, Achievement Motivation

To truly achieve your full potential, you need to take a deep look inside yourself and find out what kind of person you really are. This attempt to understand your personality is known as self-analysis. Assessing yourself in this manner will help you grow, and will also help you to identify areas within yourself that need to be further developed, changed or eliminated. You can better understand yourself by taking a deep look at what motivates you, what your attitude is like, and what your strengths and weaknesses are.

8.1.3.1 What is Motivation?

Very simply put, motivation is your reason for acting or behaving in a certain manner. It is important to understand that not everyone is motivated by the same desires – people are motivated by many, many different things. We can understand this better by looking at Maslow's Hierarchy of Needs.

8.1.3.2 Maslow's Hierarchy of Needs -

Famous American psychologist Abraham Maslow wanted to understand what motivates people. He believed that people have five types of needs, ranging from very basic needs (called physiological needs) to more important needs that are required for self-growth (called

self-actualization needs). Between the physiological and self-actualization needs are three other needs – safety needs, belongingness and love needs, and esteem needs.

Self-fulfillment Self needs actualization: achieving one's full potential, including creative activities Esteem needs: **Psychological** prestige and feeling of needs accomplishment Belongingness and love needs: intimate relationships, friends Safety needs: Basic Security, safety needs

These needs are usually shown as a pyramid with five levels and are known as Maslow's Hierarchy of Needs.

Fig. 8.1.1: Maslow's Hierarchy of Needs

The lowest level depicts the most basic needs. According to Maslow, our behaviour is driven by our basic needs, until those needs are fulfilled. Once they are fulfilled, we move to the next level and are motived by the next level of needs. Let's understand this better with an example.

Physiological needs: food, water, warmth, rest

Rupa comes from a very poor family. She never has enough food, water, warmth or rest. According to Maslow, until Rupa is sure that she will get these basic needs, she will not even think about the next level of needs – her safety needs. But, once Rupa is confident that her basic needs will be met, she will move to the next level, and her behaviour will then be motivated by her need for security and safety. Once these new needs are met, Rupa will once again move to the next level, and be motivated by her need for relationships and friends. Once this need is satisfied, Rupa will then focus on the fourth level of needs – her esteem needs, after which she will move up to the fifth and last level of needs – the desire to achieve her full potential.

8.1.3.3 Understanding Achievement Motivation

We now know that people are motivated by basic, psychological and self-fulfillment needs. However, certain people are also motivated by the achievement of highly challenging accomplishments. This is known as Achievement Motivation, or 'need for achievement'.

The level of motivation achievement in a person differs from individual to individual. It is important that entrepreneurs have a high level of achievement motivation — a deep desire to accomplish something important and unique. It is equally important that they hire people who are also highly motivated by challenges and success.

	nat Motivates You?
	nat are the things that really motivate you? List down five things that really motivate you member to answer honestly!
li	nm motivated by:
_	
h	aracteristics of Entrepreneurs with Achievement Motivation
	aracteristics of Entrepreneurs with Achievement Motivation trepreneurs with achievement motivation can be described as follows:
	trepreneurs with achievement motivation can be described as follows:
	trepreneurs with achievement motivation can be described as follows: Unafraid to take risks for personal accomplishment
	trepreneurs with achievement motivation can be described as follows: Unafraid to take risks for personal accomplishment Love being challenged Future-oriented Flexible and adaptive
	trepreneurs with achievement motivation can be described as follows: Unafraid to take risks for personal accomplishment Love being challenged Future-oriented Flexible and adaptive Value negative feedback more than positive feedback
	trepreneurs with achievement motivation can be described as follows: Unafraid to take risks for personal accomplishment Love being challenged Future-oriented Flexible and adaptive Value negative feedback more than positive feedback Very persistent when it comes to achieving goals
	trepreneurs with achievement motivation can be described as follows: Unafraid to take risks for personal accomplishment Love being challenged Future-oriented Flexible and adaptive Value negative feedback more than positive feedback Very persistent when it comes to achieving goals Extremely courageous
	trepreneurs with achievement motivation can be described as follows: Unafraid to take risks for personal accomplishment Love being challenged Future-oriented Flexible and adaptive Value negative feedback more than positive feedback Very persistent when it comes to achieving goals

Think about it:

- How many of these traits do you have?
- Can you think of entrepreneurs who display these traits?

8.1.3.4 How to Cultivate a Positive Attitude?

The good news is attitude is a choice. So, it is possible to improve, control and change our attitude, if we decide we want to!

The following tips help foster a positive mindset:

- Remember that you control your attitude, not the other way around
- Devote at least 15 minutes a day towards reading, watching or listening to something positive
- Avoid negative people who only complain and stop complaining yourself
- Expand your vocabulary with positive words and delete negative phrases from your mind
- Be appreciative and focus on what's good in yourself, in your life, and in others
- Stop thinking of yourself as a victim and start being proactive
- Imagine yourself succeeding and achieving your goals

8.1.3.5 What is Attitude?

Now that we understand why motivation is so important for self-analysis, let's look at the role our attitude plays in better understanding ourselves. Attitude can be described as your tendency (positive or negative), to think and feel about someone or something. Attitude is the foundation for success in every aspect of life. Our attitude can be our best friend or our worst enemy. In other words:

"The only disability in life is a bad attitude."

When you start a business, you are sure to encounter a wide variety of emotions, from difficult times and failures to good times and successes. Your attitude is what will see you through the tough times and guide you towards success. Attitude is also infectious. It affects everyone around you, from your customers to your employees to your investors. A positive attitude helps build confidence in the workplace while a negative attitude is likely to result in the demotivation of your people.

8.1.3.6 What Are Your Strengths and Weaknesses?

Another way to analyse yourself is by honestly identifying your strengths and weaknesses. This will help you use your strengths to your best advantage and reduce your weaknesses. Note down all your strengths and weaknesses in the two columns below. Remember to be honest with yourself!

Strengths	Weaknesses

Tips



- Achievement motivation can be learned.
- Don't be afraid to make mistakes.
- Train yourself to finish what you start.
- Dream big.

8.1.4 Honesty & Work Ethics: What is Honesty?

Honesty is the quality of being fair and truthful. It means speaking and acting in a manner that inspires trust. A person who is described as honest is seen as truthful and sincere, and as someone who isn't deceitful or devious and doesn't steal or cheat. There are two dimensions of honesty — one is honesty in communication and the other is honesty in conduct.

Honesty is an extremely important trait because it results in peace of mind and builds relationships that are based on trust. Being dishonest, on the other hand, results in anxiety and leads to relationships full of distrust and conflict.

8.1.4.1 Qualities of Honest People

Honest individuals have certain distinct characteristics. Some common qualities among honest people are:

- They don't worry about what others think of them. They believe in being themselves they don't bother about whether they are liked or disliked for their personalities.
- They stand up for their beliefs. They won't think twice about giving their honest opinion, even if they are aware that their point of view lies with the minority.
- They are think skinned. This means they are not affected by others judging them harshly for their honest opinions.
- They forge trusting, meaningful and healthy friendships. Honest people usually surround themselves with honest friends. They have faith that their friends will be truthful and upfront with them at all times.

They are trusted by their peers. They are seen as people who can be counted on for truthful and objective feedback and advice.

- Honesty and employees: When entrepreneurs build honest relationships with their employees, it leads to more transparency in the workplace, which results in higher work performance and better results.
- Honesty and investors: For entrepreneurs, being honest with investors means not only
 sharing strengths but also candidly disclosing current and potential weaknesses,
 problem areas and solution strategies. Keep in mind that investors have a lot of
 experience with startups and are aware that all new companies have problems. Claiming
 that everything is perfectly fine and running smoothly is a red flag for most investors.

• Honesty with oneself: The consequences of being dishonest with oneself can lead to dire results, especially in the case of entrepreneurs. For entrepreneurs to succeed, it is critical that they remain realistic about their situation at all times, and accurately judge every aspect of their enterprise for what it truly is.

8.1.4.2 Importance of Honesty in Entrepreneurs

One of the most important characteristics of entrepreneurs is honesty. When entrepreneurs are honest with their customers, employees and investors, it shows that they respect those that they work with. It is also important that entrepreneurs remain honest with themselves.

Let's look at how being honest would lead to great benefits for entrepreneurs.

Honesty and customers: When entrepreneurs are honest with their customers it leads
to stronger relationships, which in turn results in business growth and a stronger
customer network.

8.1.4.3 What are Work Ethics?

Being ethical in the workplace means displaying values like honesty, integrity and respect in all your decisions and communications. It means not displaying negative qualities like lying, cheating and stealing.

Workplace ethics play a big role in the profitability of a company. It is as crucial to an enterprise as high morale and teamwork. This is why most companies lay down specific workplace ethic guidelines that must compulsorily be followed by their employees. These guidelines are typically outlined in a company's employee handbook.

8.1.4.4 Elements of a Strong Work Ethic

An entrepreneur must display strong work ethics, as well as hire only those individuals who believe in and display the same level of ethical behavior in the workplace. Some elements of a strong work ethic are:

- **Professionalism:** This involves everything from how you present yourself in a corporate setting to the manner in which you treat others in the workplace.
- **Respectfulness:** This means remaining poised and diplomatic regardless of how stressful or volatile a situation is.
- **Dependability:** This means always keeping your word, whether it's arriving on time for a meeting or delivering work on time.
- **Dedication:** This means refusing to quit until the designated work is done, and completing the work at the highest possible level of excellence.
- **Determination:** This means embracing obstacles as challenges rather than letting them stop you, and pushing ahead with purpose and resilience to get the desired results.

- Accountability: This means taking responsibility for your actions and the consequences
 of your actions, and not making excuses for your mistakes.
- **Humility:** This means acknowledging everyone's efforts and had work, and sharing the credit for accomplishments.

8.1.4.5 How to Foster a Good Work Ethic?

As an entrepreneur, it is important that you clearly define the kind of behaviour that you expect from each and every team member in the workplace. You should make it clear that you expect employees to display positive work ethics like:

- **Honesty:** All work assigned to a person should be done with complete honesty, without any deceit or lies.
- Good attitude: All team members should be optimistic, energetic, and positive.
- **Reliability:** Employees should show up where they are supposed to be, when they are supposed to be there.
- **Good work habits:** Employees should always be well groomed, never use inappropriate language, conduct themselves professionally at all times and so on.
- **Initiative:** Doing the bare minimum is not enough. Every team member needs to be proactive and show initiative.
- **Trustworthiness:** Trust is non-negotiable. If an employee cannot be trusted, it's time to let that employee go.
- **Respect:** Employees need to respect the company, the law, their work, their colleagues and themselves.
- **Integrity:** Each and every team member should be completely ethical and must display above board behaviour at all times.
- **Efficiency:** Efficient employees help a company grow while inefficient employees result in a waste of time and resources.

Tips



- Don't get angry when someone tells you the truth and you don't like what you hear.
- Always be willing to accept responsibility for your mistakes.

-8.1.5 Creativity & Innovation

What is Creativity?

Creativity means thinking outside the box. It means viewing things in new ways or from different perspectives, and then converting these ideas into reality. Creativity involves two parts: thinking and producing. Simply having an idea makes you imaginative, not creative. However, having an idea and acting on it makes you creative.

Characteristics of Highly Creative People

Some characteristics of creative people are:

- They are imaginative and playful
- They see issues from different angles
- They notice small details
- They have very little tolerance for boredom
- They detest rules and routine
- They love to daydream
- They are very curious

What is Innovation?

There are many different definitions of innovation. In simple terms, innovation means turning an idea into a solution that adds value. It can also mean adding value by implementing a new product, service or process, or significantly improving on an existing product, service or process.

Characteristics of Highly Innovative People

Some characteristics of highly innovative people are:

- They embrace doing things differently
- They don't believe in taking shortcuts
- They are not afraid to be unconventional
- They are highly proactive and persistent
- They are organized, cautious and risk-averse

Tips



- Take regular breaks from your creative work to recharge yourself and gain fresh perspective.
- Build prototypes frequently, test them out, get feedback, and make the required changes.

8.1.6 Time Management

Time management is the process organizing your time and deciding how to allocate your time between different activities. Good time management is the difference between working smart (getting more done in less time) and working hard (working for more time to get more done).

Effective time management leads to an efficient work output, even when you are faced with tight deadlines and high-pressure situations. On the other hand, not managing your time effectively results in inefficient output and increases stress and anxiety.

Benefits of Time Management

Time management can lead to huge benefits like:

- Greater productivity
- Higher efficiency
- Better professional reputation
- Reduced stress
- Higher chances for career advancement
- Greater opportunities to achieve goals

Not managing time effectively can result in undesirable consequences like:

- Missing deadlines
- Inefficient work output
- Substandard work quality
- Poor professional reputation
- Stalled career
- Increase in stress and anxiety

-8.1.6.1 Traits of Effective Time Managers

Some traits of effective time managers are:

- They begin projects early
- They set daily objectives
- They modify plans if required, to achieve better results
- They are flexible and open-minded
- They inform people in advance if their help will be required
- They know how to say no
- They break tasks into steps with specific deadlines
- They continually review long term goals
- They think of alternate solutions if and when required
- They ask for help when required
- They create backup plans

8.1.6.2 Effective Time Management Techniques

You can manage your time better by putting into practice certain time management techniques. Some helpful tips are:

- Plan out your day as well as plan for interruptions. Give yourself at least 30 minutes to figure out your time plan. In your plan, schedule some time for interruptions.
- Put up a "Do Not Disturb" sign when you absolutely have to complete a certain amount of work.
- Close your mind to all distractions. Train yourself to ignore ringing phones, don't reply to chat messages and disconnect from social media sites.
- **Delegate your work.** This will not only help your work get done faster, but will also show you the unique skills and abilities of those around you.
- **Stop procrastinating.** Remind yourself that procrastination typically arises due to the fear of failure or the belief that you cannot do things as perfectly as you wish to do them.
- **Prioritize.** List each task to be completed in order of its urgency or importance level. Then focus on completing each task, one by one.
- Maintain a log of your work activities. Analyse the log to help you understand how efficient you are, and how much time is wasted every day.
- **Create time management goals** to reduce time wastage.

Tips



- Always complete the most important tasks first.
- Get at least 7 8 hours of sleep every day.
- Start your day early.
- Don't waste too much time on small, unimportant details.
- Set a time limit for every task that you will undertake.
- Give yourself some time to unwind between tasks.

8.1.7 Anger Management

Anger management is the process of:

- 1. Learning to recognize the signs that you, or someone else, is becoming angry
- 2. Taking the best course of action to calm down the situation in a positive way

Anger management does not mean suppressing anger.

Importance of Anger Management

Anger is a perfectly normal human emotion. In fact, when managed the right way, anger can be considered a healthy emotion. However, if it is not kept in check, anger can make us act inappropriately and can lead to us saying or doing things that we will likely later regret.

Extreme anger can:

- **Hurt you physically**: It leads to heart disease, diabetes, a weakened immune system, insomnia, and high blood pressure.
- **Hurt you mentally**: It can cloud your thinking and lead to stress, depression and mental health issues.
- **Hurt your career**: It can result in alienating your colleagues, bosses, clients and lead to the loss of respect.
- **Hurt your relationships**: It makes it hard for your family and friends to trust you, be honest with you and feel comfortable around you.

This is why anger management, or managing anger appropriately, is so important.

8.1.7.1 Anger Management Strategies

Here are some strategies that can help you control your anger:

Strategy 1: Relaxation

Something as simple as breathing deeply and looking at relaxing images works wonders in calming down angry feelings. Try this simple breathing exercise:

- 1. Take a deep breath from your diaphragm (don't breathe from your chest)
- 2. Visualize your breath coming up from your stomach
- 3. Keep repeating a calming word like 'relax' or 'take it easy' (remember to keep breathing deeply while repeating the word)
- 4. Picture a relaxing moment (this can be from your memory or your imagination)

Follow this relaxation technique daily, especially when you realize that you're starting to feel angry.

Strategy 2: Cognitive Restructuring

Cognitive restructuring means changing the manner in which you think. Anger can make you curse, swear, exaggerate and act very dramatically. When this happens, force yourself to replace your angry thoughts with more logical ones. For instance, instead of thinking 'Everything is ruined' change your mindset and tell yourself 'It's not the end of the world and getting angry won't solve this'.

Strategy 3: Problem Solving

Getting angry about a problem that you cannot control is a perfectly natural response. Sometimes, try as you may, there may not be a solution to the difficulty you are faced with. In such cases, stop focusing on solving the problem, and instead focus on handling and facing the problem. Remind yourself that you will do your best to deal with the situation, but that you will not blame yourself if you don't get the solution you desire.

Strategy 4: Better Communication

When you're angry, it is very easy to jump to inaccurate conclusions. In this case, you need to force yourself to stop reacting, and think carefully about what you want to say, before saying it. Avoid saying the first thing that enters your head. Force yourself to listen carefully to what the other person is saying. Then think about the conversation before responding.

Strategy 5: Changing Your Environment

If you find that your environment is the cause of your anger, try and give yourself a break from your surroundings. Make an active decision to schedule some personal time for yourself, especially on days that are very hectic and stressful. Having even a brief amount of quiet or alone time is sure to help calm you down.

8.1.7.2 Tips for Anger Management



The following tips will help you keep your anger in check:

- Take some time to collect your thoughts before you speak out in anger.
- Express the reason for your anger in an assertive, but non-confrontational manner once you have calmed down.
- Do some form of physical exercise like running or walking briskly when you feel yourself getting angry.
- Make short breaks part of your daily routine, especially during days that are stressful.
- Focus on how to solve a problem that's making you angry, rather than focusing on the fact that the problem is making you angry.

8.1.8 Stress Management

We say we are 'stressed' when we feel overloaded and unsure of our ability to deal with the pressures placed on us. Anything that challenges or threatens our well-being can be defined as a stress. It is important to note that stress can be good and bad. While good stress keeps us going, negative stress undermines our mental and physical health. This is why it is so important to manage negative stress effectively.

Causes of Stress

Stress can be caused by internal and external factors.

Internal causes of stress

- Constant worry
- Rigid thinking
- Unrealistic expectations
- Pessimism
- Negative self-talk
- All in or all out attitude

External causes of stress

- Major life changes
- Difficulties with relationships
- Having too much to do
- Difficulties at work or in school
- Financial difficulties
- Worrying about one's children and/or family

8.1.8.1 Symptoms of Stress

Stress can manifest itself in numerous ways. Take a look at the cognitive, emotional, physical and behavioural symptoms of stress.

Cognitive Symptoms	Emotional Symptoms
Memory problems	• Depression
Concentration issues	Agitation
Lack of judgement	Irritability
Pessimism	• Loneliness
Anxiety	• Anxiety
Constant worrying	• Anger

Physical Symptoms	Behavioural Symptoms
Aches and pain	Increase or decrease in appetite
Diarrhoea or constipation	Over sleeping or not sleeping
Nausea	enough
Dizziness	Withdrawing socially
Chest pain and/or rapid heartbeat	 Ignoring responsibilities
Frequent cold or flu like feelings	Consumption of alcohol or
	cigarettes
	Nervous habits like nail biting and
	pacing

8.1.8.2 Tips to Manage Stress

The following tips can help you manage your stress better:

- Note down the different ways in which you can handle the various sources of your stress.
- Remember that you cannot control everything, but you can control how you respond.
- Discuss your feelings, opinions and beliefs rather than reacting angrily, defensively or passively.
- Practice relaxation techniques like meditation, yoga or tai chi when you start feeling stressed.
- Devote a part of your day towards exercise.
- Eat healthy foods like fruits and vegetables. Avoid unhealthy foods especially those containing large amounts of sugar.
- Plan your day so that you can manage your time better, with less stress.
- Say no to people and things when required.
- Schedule time to pursue your hobbies and interests.
- Ensure you get at least 7-8 hours of sleep.
- Reduce your caffeine intake.
- Increase the time spent with family and friends.

UNIT 8.2: Digital Literacy: A Recap

Unit Objectives



At the end of this unit, you will be able to:

- 1. Identify the basic parts of a computer
- 2. Identify the basic parts of a keyboard
- 3. Recall basic computer terminology
- 4. Recall the functions of basic computer keys
- 5. Discuss the main applications of MS Office
- 6. Discuss the benefits of Microsoft Outlook
- 7. Discuss the different types of e-commerce
- 8. List the benefits of e-commerce for retailers and customers
- 9. Discuss how the Digital India campaign will help boost e-commerce in India
- 10. Describe how you will sell a product or service on an e-commerce platform

8.2.1 Computer and Internet basics

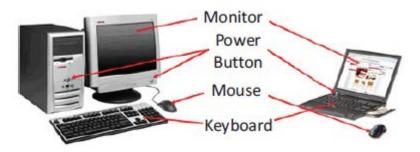


Fig.8.2.1. Parts of a Computer



Fig.8.2.2. Parts of a Keyboard

Basic Parts of a Computer

- 1. Central Processing Unit (CPU): The brain of the computer. It interprets and carries out program instructions.
- 2. Hard Drive: A device that stores large amounts of data.
- Monitor: The device that contains the computer screen where the information is visually displayed.

- 4. **Desktop:** The first screen displayed after the operating system loads.
- 5. **Background:** The image that fills the background of the desktop.
- 6. **Mouse:** A hand-held device used to point to items on the monitor.
- 7. **Speakers:** Devices that enable you to hear sound from the computer.
- 8. **Printer:** A device that converts output from a computer into printed paper documents.
- 9. **Icon:** A small picture or image that visually represents something on your computer.
- 10. Cursor: An arrow which indicates where you are positioned on the screen.
- 11. **Program Menu:** A list of programs on your computer that can be accessed from the Start menu.
- 12. **Taskbar:** The horizontal bar at the bottom of the computer screen that lists applications that are currently in use.
- 13. **Recycle Bin:** A temporary storage for deleted files.

Basic Internet Terms

- **The Internet:** A vast, international collection of computer networks that transfers information.
- The World Wide Web: A system that lets you access information on the Internet.
- **Website:** A location on the World Wide Web (and Internet) that contains information about a specific topic.
- **Homepage:** Provides information about a website and directs you to other pages on that website.
- Link/Hyperlink: A highlighted or underlined icon, graphic, or text that takes you to another file or object.
- Web Address/URL: The address for a website.
- Address Box: A box in the browser window where you can type in a web address.

Basic Computer Keys

- **Arrow Keys:** Press these keys to move your cursor.
- Space bar: Adds a space.
- Enter/Return: Moves your cursor to a new line.
- Shift: Press this key if you want to type a capital letter or the upper symbol of a key.
- Caps Lock: Press this key if you want all the letters you type to be capital letters. Press it again to revert back to typing lowercase letters.
- Backspace: Deletes everything to the left of your cursor

Tips



- When visiting a .com address, there no need to type http://or even www. Just type the
 name of the website and then press Ctrl + Enter. (Example: Type 'apple' and press Ctrl +
 Enter to go to www.apple.com)
- Press the Ctrl key and press the + or to increase and decrease the size of text.
- Press F5 or Ctrl + R to refresh or reload a web page.

8.2.2 MS Office and Email

About MS Office

MS Office or Microsoft Office is a suite of computer programs developed by Microsoft. Although meant for all users, it offers different versions that cater specifically to students, home users and business users. All the programs are compatible with both, Windows and Macintosh.

Most Popular Office Products

Some of the most popular and universally used MS Office applications are:

- Microsoft Word: Allows users to type text and add images to a document.
- **Microsoft Excel**: Allows users to enter data into a spreadsheet and create calculations and graphs.
- Microsoft PowerPoint: Allows users to add text, pictures and media and create slideshows and presentations.
- Microsoft Outlook: Allows users to send and receive email.
- **Microsoft OneNote**: Allows users to make drawings and notes with the feel of a pen on paper.
- Microsoft Access: Allows users to store data over many tables.

Why Choose Microsoft Outlook?

A popular email management choice especially in the workplace, Microsoft Outlook also includes an address book, notebook, web browser and calendar. Some major benefits of this program are:

- Integrated search function: You can use keywords to search for data across all Outlook programs.
- **Enhanced security**: Your email is safe from hackers, junk mail and phishing website email.
- **Email syncing**: Sync your mail with your calendar, contact list, notes in One Note and...your phone!
- Offline access to email: No Internet? No problem! Write emails offline and send them when you're connected again.

Tips



- Press Ctrl+R as a shortcut method to reply to email.
- Set your desktop notifications only for very important emails.
- Flag messages quickly by selecting messages and hitting the Insert key.
- Save frequently sent emails as a template to reuse again and again.
- Conveniently save important emails as files.

-8.2.3 E-Commerce

What is E-Commerce?

E-commerce is the buying or selling of goods and services, or the transmitting of money or data, electronically on the internet. E-Commerce is the short form for "electronic commerce."

Examples of E-Commerce

Some examples of e-commerce are:

- Online shopping
- Online auctions
- Online ticketing
- Electronic payments
- Internet banking

Types of E-Commerce

E-commerce can be classified based on the types of participants in the transaction. The main types of e-commerce are:

- **Business to Business (B2B)**: Both the transacting parties are businesses.
- Business to Consumer (B2C): Businesses sell electronically to end-consumers.
- Consumer to Consumer (C2C): Consumers come together to buy, sell or trade items to other consumers.
- Consumer-to-Business (C2B): Consumers make products or services available for purchase to companies looking for exactly those services or products.
- **Business-to-Administration (B2A)**: Online transactions conducted between companies and public administration.
- Consumer-to-Administration (C2A): Online transactions conducted between individual and public administration.

8.2.3.1 Benefits of E-Commerce

The e-commerce business provides some benefits for retailers and customers.

Benefits for retailers

- Establishes an online presence
- Reduces operational costs by removing overhead costs
- Increases brand awareness through the use of good keywords
- Increases sales by removing geographical and time constraints

Benefits for customers

- Offers a wider range of choice than any physical store
- Enables goods and services to be purchased from remote locations
- Enables consumers to perform price comparisons

8.2.3.2 Digital India Campaign

Prime Minister Narendra Modi launched the Digital India campaign in 2015, with the objective of offering every citizen of India access to digital services, knowledge and information. The campaign aims to improve the country's online infrastructure and increase internet connectivity, thus boosting the e-commerce industry.

Currently, the majority of online transactions come from tier 2 and tier 3 cities. Once the Digital India campaign is in place, the government will deliver services through mobile connectivity, which will help deliver internet to remote corners of the country. This will help the e-commerce market to enter India's tier 4 towns and rural areas.

E-Commerce Activity

Choose a product or service that you want to sell online. Write a brief note explaining how you will use existing e-commerce platforms, or create a new e-commerce platform, to sell your product or service.

Tips



- Before launching your e-commerce platform, test everything.
- Pay close and personal attention to your social media.

UNIT 8.3: Money Matters

Unit Objectives



At the end of this unit, you will be able to:

- 1. Discuss the importance of saving money
- 2. Discuss the benefits of saving money
- 3. Discuss the main types of bank accounts
- 4. Describe the process of opening a bank account
- 5. Differentiate between fixed and variable costs
- 6. Describe the main types of investment options
- 7. Describe the different types of insurance products
- 8. Describe the different types of taxes
- 9. Discuss the uses of online banking
- 10. Discuss the main types of electronic funds transfers

8.3.1 Personal Finance – Why to Save?

Importance of Saving

We all know that the future is unpredictable. You never know what will happen tomorrow, next week or next year. That's why saving money steadily through the years is so important. Saving money will help improve your financial situation over time. But more importantly, knowing that you have money stashed away for an emergency will give you peace of mind. Saving money also opens the door to many more options and possibilities.

Benefits of Saving

Inculcating the habit of saving leads to a vast number of benefits. Saving helps you:

- Become financially independent: When you have enough money saved up to feel secure you can start making your choices, from taking a vacation whenever you want, to switching careers or starting your own business.
- **Invest in yourself through education**: Through saving, you can earn enough to pay up for courses that will add to your professional experience and ultimately result in higher paying jobs.
- Get out of debt: Once you have saved enough as a reserve fund, you can use your savings to pay off debts like loans or bills that have accumulated over time.
- Be prepared for surprise expenses: Having money saved enables you to pay for unforeseen expenses like sudden car or house repairs, without feeling financially
- Pay for emergencies: Saving helps you deal with emergencies like sudden health issues or emergency trips without feeling financially burdened.

- Afford large purchases and achieve major goals: Saving diligently makes it possible to
 place down payments towards major purchases and goals, like buying a home or a car.
- **Retire**: The money you have saved over the years will keep you comfortable when you no longer have the income you would get from your job.

Tips

- Break your spending habit. Try not spending on one expensive item per week, and put the money that you would have spent into your savings.
- Decide that you will not buy anything on certain days or weeks and stick to your word.

8.3.2 Types of Bank Accounts

In India, banks offer four main types of bank accounts. These are:

- 1. Current Accounts
- 2. Savings Accounts
- 3. Recurring Deposit Accounts
- 4. Fixed Deposit Accounts

Current Accounts

Current accounts offer the most liquid deposits and thus, are best suited for businessmen and companies. As these accounts are not meant for investments and savings, there is no imposed limit on the number or amount of transactions that can be made on any given day. Current account holders are not paid any interest on the amounts held in their accounts. They are charged for certain services offered on such accounts.

Saving Accounts

Savings accounts are meant to promote savings, and are therefore the number one choice for salaried individuals, pensioners and students. While there is no restriction on the number and amount of deposits made, there are usually restrictions on the number and amount of withdrawals. Savings account holders are paid interest on their savings.

Recurring Deposit Accounts

Recurring Deposit accounts, also called RD accounts, are the accounts of choice for those who want to save an amount every month, but are unable to invest a large sum at one time. Such account holders deposit a small, fixed amount every month for a pre-determined period (minimum 6 months). Defaulting on a monthly payment results in the account holder being charged a penalty amount. The total amount is repaid with interest at the end of the specified period.

Fixed Deposit Accounts

Fixed Deposit accounts, also called FD accounts, are ideal for those who wish to deposit their savings for a long term in return for a high rate of interest. The rate of interest offered depends on the amount deposited and the time period, and also differs from bank to bank. In the case of an FD, a certain amount of money is deposited by the account holder for a fixed period of time. The money can be withdrawn when the period expires. If necessary, the depositor can break the fixed deposit prematurely. However, this usually attracts a penalty amount which also differs from bank to bank.

8.3.2.1 Opening a Bank Account

Opening a bank account is quite a simple process. Take a look at the steps to open an account of your own:

Step 1: Fill in the Account Opening Form

This form requires you to provide the following information:

- Personal details (name, address, phone number, date of birth, gender, occupation, address)
- Method of receiving your account statement (hard copy/email)
- Details of your initial deposit (cash/cheque)
- Manner of operating your account (online/mobile banking/traditional via cheque, slip books)
- Ensure that you sign wherever required on the form.

Step 2: Affix your Photograph

Stick a recent photograph of yourself in the allotted space on the form.

Step 3: Provide your Know Your Customer (KYC) Details

KYC is a process that helps banks verify the identity and address of their customers. To open an account, every individual need to submit certain approved documents with respect to photo identity (ID) and address proof. Some Officially Valid Documents (OVDs) are:

- Passport
- Driving License
- Voters' Identity Card
- PAN Card
- UIDAI (Aadhar) Card

Step 4: Submit All your Documents

Submit the completed Account Opening Form and KYC documents. Then wait until the forms are processed and your account has been opened!

Tips



- Select the right type of account.
- Fill in complete nomination details.
- Ask about fees.
- Understand the rules.
- Check for online banking it's convenient!
- Keep an eye on your bank balance.

-8.3.3 Costs: Fixed vs Variable

What are Fixed and Variable Costs?

Fixed costs and variable costs together make up a company's total cost. These are the two types of costs that companies have to bear when producing goods and services. A fixed cost does not change with the volume of goods or services a company produces. It always remains the same.

A variable cost, on the other hand, increases and decreases depending on the volume of goods and services produced. In other words, it varies with the amount produced.

Differences between Fixed and Variable Costs

Let's take a look at some of the main differences between fixed and variable costs:

Criteria	Fixed Costs	Variable Costs
Meaning	A cost that stays the same, regardless of the output produced.	A cost that changes when the
Nature	Time related.	Volume related.
Incurred	Incurred irrespective of units being produced.	Incurred only when units are produced
Unit cost	Inversely proportional to the number of units produced	Remains the same, per unit.
Examples	Depreciation, rent, salary, insurance and tax	Material consumed, wages, commission on sales and packing expenses

Tips 🖳

When trying to determine whether a cost is fixed or variable, simply ask the following
question: Will the particular cost change if the company stopped its production
activities? If the answer is no, then it is a fixed cost. If the answer is yes, then it is
probably a variable cost.

-8.3.4 Investment, Insurance and Taxes

Investment

Investment means that money is spent today with the aim of reaping financial gains at a future time. The main types of investment options are as follows:

- **Bonds:** Bonds are instruments used by public and private companies to raise large sums of money too large to be borrowed from a bank. These bonds are then issued in the public market and are bought by lenders.
- **Stocks:** Stocks or equity are shares that are issued by companies and are bought by the general public.
- Small Savings Schemes: Small Savings Schemes are tools meant to save money in small amounts. Some popular schemes are the Employees Provident Fund, Sukanya Samriddhi Scheme and National Pension Scheme.
- **Mutual Funds:** Mutual Funds are professionally managed financial instruments that invest money in different securities on behalf of investors.
- **Fixed Deposits:** A fixed amount of money is kept aside with a financial institution for a fixed amount of time in return for interest on the money.
- **Real Estate:** Loans are taken from banks to purchase real estate, which is then leased or sold with the aim of making a profit on the appreciated property price.
- **Hedge Funds:** Hedge funds invest in both financial derivatives and/or publicly traded securities.
- **Private Equity:** Private Equity is trading in the shares of an operating company that is not publicly listed and whose shares are not available on the stock market.
- **Venture Capital:** Venture Capital involves investing substantial capital in a budding company in return for stocks in that company.

Insurance

There are two types of insurance, Life Insurance and General Insurance.

Life Insurance Products

The main life insurance products are:

• **Term Insurance:** This is the simplest and cheapest form of insurance. It offers financial protection for a specified tenure, say 15 to 20 years. In the case of your death, your family is paid the sum assured. In the case of your surviving the term, the insurer pays nothing.

- **Endowment Policy:** This offers the dual benefit of insurance and investment. Part of the premium is allocated towards the sum assured, while the remaining premium gets invested in equity and debt. It pays a lump sum amount after the specified duration or on the death of the policyholder, whichever is earlier.
- Unit-Linked Insurance Plan (ULIP): Here part of the premium is spent on the life cover, while the remaining amount is invested in equity and debt. It helps develop a regular saving habit.
- Money Back Life Insurance: While the policyholder is alive, periodic payments of the
 partial survival benefits are made during the policy tenure. On the death of the insured,
 the insurance company pays the full sum assured along with survival benefits.
- Whole Life Insurance: It offers the dual benefit of insurance and investment. It offers insurance cover for the whole life of the person or up to 100 years whichever is earlier.

General Insurance

General Insurance deals with all insurance covering assets like animals, agricultural crops, goods, factories, cars and so on.

General Insurance Products

The main general insurance products are:

- **Motor Insurance:** This can be divided into Four-Wheeler Insurance and Two-Wheeler insurance.
- **Health Insurance:** The main types of health insurance are individual health insurance, family floater health insurance, comprehensive health insurance and critical illness insurance.
- **Travel Insurance:** This can be categorised into Individual Travel Policy, Family Travel Policy, Student Travel Insurance and Senior Citizen Health Insurance.
- **Home Insurance:** This protects the house and its contents from risk.
- Marine Insurance: This insurance covers goods, freight and cargo against loss or damage during transit by rail, road, sea and/or air.

Taxes

There are two types of taxes:

- 1. Direct Taxes
- 2. Indirect Taxes.

Direct Tax

Direct taxes are levied directly on an entity or a person and are non-transferrable. Some examples of Direct Taxes are:

- **Income Tax:** This tax is levied on your earning in a financial year. It is applicable to both, individuals and companies.
- Capital Gains Tax: This tax is payable whenever you receive a sizable amount of money. It is usually of two types short term capital gains from investments held for less than 36 months and long term capital gains from investments held for longer than 36 months.

- **Securities Transaction Tax:** This tax is added to the price of a share. It is levied every time you buy or sell shares.
- **Perquisite Tax:** This tax is levied is on perks that have been acquired by a company or used by an employee.
- Corporate Tax: Corporate tax is paid by companies from the revenue they earn.

Indirect Tax

Indirect taxes are levied on goods or services. Some examples of Indirect Taxes are:

- Sales Tax: Sales Tax is levied on the sale of a product.
- **Service Tax:** Service Tax is added to services provided in India.
- Value Added Tax: Value Added Tax is levied at the discretion of the state government. The tax is levied on goods sold in the state. The tax amount is decided by the state.
- **Customs Duty & Octroi:** Customs Duty is a charge that is applied on purchases that are imported from another country. Octroi is levied on goods that cross state borders within India.
- Excise Duty: Excise Duty is levied on all goods manufactured or produced in India

Tips

- Think about how quickly you need your money back and pick an investment option accordingly.
- Ensure that you are buying the right type of insurance policy for yourself.
- Remember, not paying taxes can result in penalties ranging from fines to imprisonment.

8.3.5 Online Banking, NEFT, RTGS etc.

What is Online Banking?

Internet or online banking allows account holders to access their account from a laptop at any location. In this way, instructions can be issued. To access an account, account holders simply need to use their unique customer ID number and password.

Internet banking can be used to:

- Find out an account balance
- Transfer amounts from one account to another
- Arrange for the issuance of cheques
- Instruct payments to be made
- Request for a cheque book
- Request for a statement of accounts
- Make a fixed deposit

Electronic Funds Transfers

Electronic funds transfer is a convenient way of transferring money from the comfort of one's own home, using integrated banking tools like internet and mobile banking.

Transferring funds via an electronic gateway is extremely convenient. With the help of online banking, you can choose transferring funds:

- Into your accounts of the same bank.
- Into other people's accounts of the same bank.
- Into accounts in different banks through NEFT.
- Into other bank accounts though RTGS.
- Into various accounts through IMPS.

NEFT

NEFT stands for National Electronic Funds Transfer. This money transfer system allows you to electronically transfer funds from your respective bank accounts to any other account, either in the same bank or belonging to any other bank. NEFT can be used by individuals, firms and corporate organizations to transfer funds between accounts.

In order to transfer funds via NEFT, two things are required:

- A transferring bank
- A destination bank

Before you can transfer funds through NEFT, you will need to register the beneficiary who will be receiving the funds. In order to complete this registration, you will require the following information:

- Recipient's name
- Recipient's account number
- Recipient's bank's name
- Recipient's bank's IFSC code

RTGS

RTGS stands for Real Time Gross Settlement. This is a real time funds transfer system which enables you to transfer funds from one bank to another, in real time or on a gross basis. The transferred amount is immediately deducted from the account of one bank, and instantly credited to the other bank's account. The RTGS payment gateway is maintained by the Reserve Bank of India. The transactions between banks are made electronically.

RTGS can be used by individuals, companies and firms to transfer large sums of money. Before remitting funds through RTGS, you will need to add the beneficiary and his bank account details via your online banking account.

In order to complete this registration, you will require the following information:

- Name of the beneficiary
- Beneficiary's account number
- Beneficiary's bank address
- Bank's IFSC code

IMPS

IMPS stands for Immediate Payment Service. This is a real-time, inter-bank, electronic funds transfer system used to transfer money instantly within banks across India. IMPS enables users to make instant electronic transfer payments using mobile phones through both, Mobile Banking and SMS. It can also be used through ATMs and online banking. IMPS is available 24 hours a day and 7 days a week. The system features a secure transfer gateway and immediately confirms orders that have been fulfilled.

To transfer money through IMPS, you need to:

- Register for IMPS with your bank
- Receive a Mobile Money Identifier (MMID) from the bank
- Receive a MPIN from the bank

Once you have both these, you can login or make a request through SMS to transfer a particular amount to a beneficiary.

In order for the beneficiary to receive the transferred money, he must:

- Link his mobile number with his respective account
- Receive the MMID from the bank

In order to initiate a money transfer through IMPS, you will need to enter the following information:

- The beneficiary's mobile number
- The beneficiary's MMID
- The transfer amount
- Your MPIN

As soon as money has been deducted from your account and credited into the beneficiary's account, you will be sent a confirmation SMS with a transaction reference number, for future reference.

-8.3.5.1 Differences between NEFT, RTGS & IMPS

Criteria	NEFT	RTGS	IMPS
Settlement	Done in batches	Real-time	Real-time
Full form	National Electronic Fund Transfer	Real Time Gross Settlement	Immediate Payment Service
Timings on Monday – Friday	8:00 am – 6:30 pm	9:00 am – 4:30 pm	24x7
Timings on Saturday	8:00 am – 1:00 pm	9:00 am – 1:30 pm	24x7
Minimum amount of money transfer limit	₹1	₹2 lacs	₹1
Maximum amount of money transfer limit	₹10 lacs	₹10 lacs per day	₹2 lacs
Maximum charges as per RBI	Up to 10,000 – ₹2.5 above 10,000 – 1 lac - ₹5 above 1 – 2 lacs ₹15 above 2 – 5 lacs ₹25 above 5 – 10 lacs ₹25	above 2 – 5 lacs ₹25 above 5 – 10 lacs ₹50	Up to 10,000 - ₹5 above 10,000 - 1 lac - ₹5 above 1 - 2 lacs - ₹15

Fig.8.3.2: Differences Between NEFT, RTGS & IMPS

Tips



- Never click on any links in any e-mail message to access your online banking website.
- You will never be asked for your credit or debit card details while using online banking.
- Change your online banking password regularly.

UNIT 8.4: Preparing for Employment & Self-Employment

Unit Objectives 6



At the end of this unit, you will be able to:

- 1. Discuss the steps to prepare for an interview
- 2. Discuss the steps to create an effective Resume
- 3. Discuss the most frequently asked interview questions
- 4. Discuss how to answer the most frequently asked interview questions
- 5. Discuss basic workplace terminology

-8.4.1 Interview Preparation: How to Prepare for an Interview?

The success of your getting the job that you want depends largely on how well your interview for that job goes. Therefore, before you go in for your interview, it is important that you prepare for it with a fair amount of research and planning. Take a look at the steps to follow in order to be well prepared for an interview:

- Research the organization that you are having the interview with.
 - Studying the company beforehand will help you be more prepared at the time of the interview. Your knowledge of the organization will help you answer questions at the time of the interview, and will leave you looking and feeling more confident. This is sure to make you stand out from other, not as well informed, candidates.
 - Look for background information on the company. Ty and find an overview of the company and its industry profile.
 - Visit the company website to get a good idea of what the company does. A company website offers a wealth of important information. Read and understand the company's mission statement. Pay attention to the company's products/services and client list. Read through any press releases to get an idea of the company's projected growth and stability.
 - Note down any questions that you have after your research has been completed.
- 2. Think about whether your skills and qualifications match the job requirements.
 - Carefully read through and analyse the job description.
 - Make a note of the knowledge, skills and abilities required to fulfil the job requirements.
 - Take a look at the organization hierarchy. Figure out where the position you are applying for fits into this hierarchy.

3. Go through the most typical interview questions asked, and prepare your responses.

- Remember, in most interviews a mix of resume-based, behavioural and case study questions are asked.
- Think about the kind of answers you would like to provide to typical questions asked in these three areas.
- Practice these answers until you can express them confidently and clearly.

4. Plan your attire for the interview.

- It is always safest to opt for formal business attire, unless expressly informed to dress in business casual (in which case you should use your best judgement).
- Ensure that your clothes are clean and well-ironed. Pick neutral colours nothing too bright or flashy.
- The shoes you wear should match your clothes, and should be clean and suitable for an interview.
- Remember, your aim is to leave everyone you meet with the impression that you are a professional and highly efficient person.

5. Ensure that you have packed everything that you may require during the interview.

- Carry a few copies of your resume. Use a good quality paper for your resume print outs.
- Always take along a notepad and a pen.
- Take along any information you may need to refer to, in order to fill out an application form.
- Carry a few samples of your work, if relevant.

6. Remember the importance of non-verbal communication.

- Practice projecting confidence. Remind yourself to smile and make eye contact. Practice giving a firm handshake.
- Keep in mind the importance of posture. Practice sitting up straight. Train yourself to stop nervous gestures like fidgeting and foot-tapping.
- Practice keeping your reactions in check. Remember, your facial expressions provide a good insight into your true feelings. Practice projecting a positive image.

7. Make a list of questions to end the interview with.

- Most interviews will end with the interviewer(s) asking if you have any questions.
 This is your chance to show that you have done your research and are interested in learning more about the company.
- If the interviewer does not ask you this question, you can inform him/her that you have some queries that you would like to discuss. This is the time for you to refer to the notes you made while studying the company.
- Some good questions to ask at this point are:
 - O What do you consider the most important criteria for success in this job?
 - o How will my performance be evaluated?
 - O What are the opportunities for advancement?
 - O What are the next steps in the hiring process?
- Remember, never ask for information that is easily available on the company website.

Tips

- Ask insightful and probing questions.
- When communicating, use effective forms of body language like smiling, making eye contact, and actively listening and nodding. Don't slouch, play with nearby items, fidget, chew gum, or mumble.

8.4.2 Preparing an Effective Resume

A resume is a formal document that lists a candidate's work experience, education and skills. A good resume gives a potential employer enough information to believe the applicant is worth interviewing. That's why it is so important to create a résumé that is effective. Take a look at the steps to create an effective resume:

Step 1: Write the Address Section

The Address section occupies the top of your resume. It includes information like your name, address, phone number and e-mail address. Insert a bold line under the section to separate it from rest of your resume.

Example:

Jasmine Watts

Breach Candy, Mumbai – India Contact No: +91 2223678270 Email: jasmine.watts@gmail.com

Step 2: Add the Profile Summary Section

This part of your resume should list your overall experiences, achievements, awards, certifications and strengths. You can make your summary as short as 2-3 bullet points or as long as 8-10 bullet points.

Example:

Profile Summary

- A Content Writer graduated from University of Strathclyde having 6 years of experience in writing website copy.
- Core expertise lies in content creation for e-learning courses, specifically for the K-12 segment.

Step 3: Include Your Educational Qualifications

When listing your academic records, first list your highest degree. Then add the second highest qualification under the highest one and so on. To provide a clear and accurate picture of your educational background, it is critical that include information on your position, rank, percentage or CPI for every degree or certification that you have listed.

If you have done any certifications and trainings, you can add a Trainings & Certifications section under your Educational Qualifications section.

Example:

Educational Qualifications

- Masters in International Management (2007) from Columbia University with 8.8 CPI.
- Bachelor of Management Studies (2004) from Mumbai University with 87% marks.
- 10+2 with Math, Stats (2001) from Maharashtra Board with 91% marks.
- High School (1999) from Maharashtra Board with 93% marks.

Step 4: List Your Technical Skills

When listing your technical skills, start with the skills that you are most confident about. Then add the skills that you do not have as good a command over. It is perfectly acceptable to include just one skill, if you feel that particular skill adds tremendous value to your résumé. If you do not have any technical skills, you can omit this step.

Example:

Technical Skills

- Flash
- Photoshop

Step 5: Insert Your Academic Project Experience

List down all the important projects that you have worked on. Include the following information in this section:

- Project title
- Organization
- Platform used

- Contribution
- Description

Example:

Academic Projects

Project Title: Different Communication Skills

Organization: True Blue Solutions

Platform used: Articulate

Contribution: Content writing and graphic visualization

Description: Development of storyboards for corporate induction & training programs

Step 6: List Your Strengths

This is where you list all your major strengths. This section should be in the form of a bulleted list.

Example:

Strengths

- Excellent oral, written and presentation skills
- Action-oriented and result-focused
- Great time management skills

Step 7: List Your Extracurricular Activities

It is very important to show that you have diverse interests and that your life consists of more than academics. Including your extracurricular activities can give you an added edge over other candidates who have similar academic scores and project experiences. This section should be in the form of a bulleted list.

Example:

Extracurricular Activities

- Member of the Debate Club
- Played tennis at a national level
- Won first prize in the All India Camel Contest, 2010

Step 8: Write Your Personal Details

The last section of your résumé must include the following personal information:

Date of birth

• Gender & marital status

Nationality

Languages known

Example:

Personal Details

Date of birth: 25th May, 1981
 Gender & marital status: Female, Single

Nationality: Indian

Languages known: English, Hindi, Tamil, French

Tips

- Keep your resume file name short, simple and informational.
- Make sure the resume is neat and free from typing errors.
- Always create your resume on plain white paper.

8.4.3 Interview FAQs

Take a look at some of the most frequently asked interview questions, and some helpful tips on how to answer them.

Q1. Can you tell me a little about yourself?

Tips to answer:

- Don't provide your full employment or personal history.
- Offer 2-3 specific experiences that you feel are most valuable and relevant.
- Conclude with how those experiences have made you perfect for this specific role.

Q2. How did you hear about the position?

Tips to answer:

- Tell the interviewer how you heard about the job whether it was through a friend (name the friend), event or article (name them) or a job portal (say which one).
- Explain what excites you about the position and what in particular caught your eye about this role.

Q3. What do you know about the company?

Tips to answer:

- Don't recite the company's About Us page.
- Show that you understand and care about the company's goals.
- Explain why you believe in the company's mission and values.

Q4. Why do you want this job?

Tips to answer:

- Show that you are passionate about the job.
- Identify why the role is a great fit for you.
- Explain why you love the company.

Q5. Why should we hire you?

Tips to answer:

- Prove through your words that you can not only do the work, but can definitely deliver excellent results.
- Explain why you would be a great fit with the team and work culture.
- Explain why you should be chosen over any other candidate.

Q6. What are your greatest professional strengths?

Tips to answer:

- Be honest share some of your real strengths, rather than give answers that you think sound good.
- Offer examples of specific strengths that are relevant to the position you are applying for.
- Provide examples of how you've demonstrated these strengths.

Q7. What do you consider to be your weaknesses?

Tips to answer:

- The purpose of this question is to gauge your self-awareness and honesty.
- Give an example of a trait that you struggle with, but that you're working on to improve.

Q8. What are your salary requirements?

Tips to answer:

- Do your research beforehand and find out the typical salary range for the job you are applying for.
- Figure out where you lie on the pay scale based on your experience, education, and skills.
- Be flexible. Tell the interviewer that you know your skills are valuable, but that you want the job and are willing to negotiate.

Q9. What do you like to do outside of work?

Tips to answer:

- The purpose of this question is to see if you will fit in with the company culture.
- Be honest open up and share activities and hobbies that interest and excite you.

Q10. If you were an animal, which one would you want to be?

Tips to answer:

- The purpose of this question is to see if you are able to think on your feet.
- There's no wrong answer but to make a great impression try to bring out your strengths or personality traits through your answer.

Q11: What do you think we could do better or differently?

Tips to answer:

- The purpose of this question is to see if you have done your research on the company, and to test whether you can think critically and come up with new ideas.
- Suggest new ideas. Show how your interests and expertise would help you execute these ideas.

Q12: Do you have any questions for us?

Tips to answer:

- Do not ask questions to which the answers can be easily found on the company website
 or through a quick online search.
- Ask intelligent questions that show your ability to think critically.

Tips



- Be honest and confident while answering.
- Use examples of your past experiences wherever possible to make your answers more impactful.

8.4.4 Work Readiness – Terms & Terminologies

Every employee should be well versed in the following terms:

- Annual leave: Paid vacation leave given by employers to employees.
- **Background Check:** A method used by employers to verify the accuracy of the information provided by potential candidates.
- **Benefits:** A part of an employee's compensation package.
- **Breaks:** Short periods of rest taken by employees during working hours.
- **Compensation Package:** The combination of salary and benefits that an employer provides to his/her employees.
- Compensatory Time (Comp Time): Time off in lieu of pay.
- **Contract Employee:** An employee who works for one organization that sells said employee's service to another company, either on a project or time basis.
- **Contract of Employment:** When an employee is offered work in exchange for wages or salary, and accepts the offer made by the employer, a contract of employment exists.
- **Corporate Culture:** The beliefs and values shared by all the members of a company, and imparted from one generation of employees to another.
- **Counter Offer/Counter Proposal:** A negotiation technique used by potential candidates to increase the amount of salary offered by a company.
- **Cover Letter:** A letter that accompanies a candidate's resume. It emphasizes the important points in the candidate's resume and provides real examples that prove the candidate's ability to perform the expected job role.
- **Curriculum Vitae (CV)/Resume:** A summary of a candidate's achievements, educational work experience, skills and strengths.
- **Declining Letter:** A letter sent by an employee to an employer, turning down the job offer employer to the employee.
- **Deductions:** Amounts subtracted from an employee's pay and listed on the employee's pay slip.
- **Discrimination:** The act of treating one person not as favourably as another person.
- **Employee:** A person who works for another person in exchange for payment.
- **Employee Training:** A workshop or in-house training that an employee is asked to attend by his or her superior, for the benefit of the employer.
- **Employment Gaps:** Periods of unemployed time between jobs.
- **Fixed-Term Contract:** A contract of employment which gets terminated on an agreed-upon date.
- **Follow-Up:** The act of contacting a potential employer after a candidate has submitted his or her resume.
- Freelancer/Consultant/Independent Contractor: A person who works for him or herself for temporary jobs and projects with different employers.
- Holiday: Paid time-off from work.
- **Hourly Rate**: The amount of salary or wages paid for 60 minutes of work.

- **Internship**: A job opportunity offered by an employer to a potential employee, called an at the employer's company for a fixed, limited time period.
- **Interview**: A conversation between a potential employee and a representative of an order to determine if the potential employee should be hired.
- **Job Application**: A form which asks for a candidate's information like the candidate's name, details and work experience. The purpose of a candidate submitting a job application, is to show that candidate's interest in working for a particular company.
- Job Offer: An offer of employment made by an employer to a potential employee.
- **Job Search Agent**: A program that enables candidates to search for employment opportunities by selecting criteria listed in the program, for job vacancies. background, made by the and pitches intern, to work employer, in address, contact
- Lay Off: A lay off occurs when an employee is temporarily let go from his or her job, due to the employer not having any work for that employee.
- **Leave**: Formal permission given to an employee, by his or her employer, to take a leave of absence from work.
- **Letter of Acceptance**: A letter given by an employer to an employee, confirming the offer of employment made by the employer, as well as the conditions of the offer.
- Letter of Agreement: A letter that outlines the terms of employment.
- Letter of Recommendation: A letter written for the purpose of validating the work skills of a person.
- **Maternity Leave**: Leave taken from work by women who are pregnant, or who have just given birth.
- **Mentor**: A person who is employed at a higher level than you, who offers you advice and guides you in your career.
- Minimum wage: The minimum wage amount paid on an hourly basis.
- **Notice**: An announcement made by an employee or an employer, stating that the employment contract will end on a particular date.
- Offer of Employment: An offer made by an employer to a prospective employee that contains important information pertaining to the job being offered, like the starting date, salary, working conditions etc.
- **Open-Ended Contract**: A contract of employment that continues till the employer or terminates it.
- **Overqualified**: A person who is not suited for a particular job because he or she has too m any years of work experience, or a level of education that is much higher than required f or the job, or is currently or was previously too highly paid.
- **Part-Time Worker**: An employee who works for fewer hours than the standard number of hours normally worked.
- Paternity Leave: Leave granted to a man who has recently become a father.
- Recruiters/Head-hunters/Executive Search Firms: Professionals who are paid by employers to search for people to fill particular positions.
- **Resigning/Resignations**: When an employee formally informs his or her employer that he or she is quitting his or her job.

- **Self-Employed**: A person who has his or her own business and does not work in the capacity of an employee.
- **Time Sheet**: A form that is submitted to an employer, by an employee, that contains the number of hours worked every day by the employee.

UNIT 8.5: Understanding Entrepreneurship

Unit Objectives 6



At the end of this unit, you will be able to:

- 1. Discuss the concept of entrepreneurship
- 2. Discuss the importance of entrepreneurship
- 3. Describe the characteristics of an entrepreneur
- 4. Describe the different types of enterprises
- 5. List the qualities of an effective leader
- 6. Discuss the benefits of effective leadership
- 7. List the traits of an effective team
- 8. Discuss the importance of listening effectively
- 9. Discuss how to listen effectively
- 10. Discuss the importance of speaking effectively
- 11. Discuss how to speak effectively
- 12. Discuss how to solve problems
- 13. List important problem solving traits
- 14. Discuss ways to assess problem solving skills
- 15. Discuss the importance of negotiation
- 16. Discuss how to negotiate
- 17. Discuss how to identify new business opportunities
- 18. Discuss how to identify business opportunities within your business
- 19. Understand the meaning of entrepreneur
- 20. Describe the different types of entrepreneurs
- 21. List the characteristics of entrepreneurs
- 22. Recall entrepreneur success stories
- 23. Discuss the entrepreneurial process
- 24. Describe the entrepreneurship ecosystem
- 25. Discuss the government's role in the entrepreneurship ecosystem
- 26. Discuss the current entrepreneurship ecosystem in India
- 27. Understand the purpose of the Make in India campaign
- 28. Discuss the relationship between entrepreneurship and risk appetite
- 29. Discuss the relationship between entrepreneurship and resilience
- 30. Describe the characteristics of a resilient entrepreneur
- 31. Discuss how to deal with failure

8.5.1 Concept Introduction

Anyone who is determined to start a business, no matter what the risk, is an entrepreneur. Entrepreneurs run their own start-up, take responsibility for the financial risks and use creativity, innovation and vast reserves of self-motivation to achieve success. They dream big and are determined to do whatever it takes to turn their idea into a viable offering. The aim of an entrepreneur is to create an enterprise. The process of creating this enterprise is known as entrepreneurship.

8.5.1.1 Importance of Entrepreneurship

Entrepreneurship is very important for the following reasons:

- 1. It results in the creation of new organizations
- 2. It brings creativity into the marketplace
- 3. It leads to improved standards of living
- 4. It helps develop the economy of a country

-8.5.1.2 Characteristics of Entrepreneurs

All successful entrepreneurs have certain characteristics in common.

They are all:

- Extremely passionate about their work
- Confident in themselves
- Disciplined and dedicated
- Motivated and driven
- Highly creative
- Visionaries
- Open-minded
- Decisive

Entrepreneurs also have a tendency to:

- Have a high-risk tolerance
- Thoroughly plan everything
- Manage their money wisely
- Make their customers their priority
- Understand their offering and their market in detail
- Ask for advice from experts when required
- Know when to cut their losses

8.5.1.3 Examples of Famous Entrepreneurs

Some famous entrepreneurs are:

- Bill Gates (Founder of Microsoft)
- Steve Jobs (Co-founder of Apple)
- Mark Zuckerberg (Founder of Facebook)
- Pierre Omidyar (Founder of eBay)

8.5.1.4 Types of Enterprises

As an entrepreneur in India, you can own and run any of the following types of enterprises:

Sole Proprietorship

In a sole proprietorship, a single individual owns, manages and controls the enterprise. This type of business is the easiest to form with respect to legal formalities. The business and the owner have no separate legal existence. All profit belongs to the proprietor, as do all the losses the liability of the entrepreneur is unlimited.

Partnership

A partnership firm is formed by two or more people. The owners of the enterprise are called partners. A partnership deed must be signed by all the partners. The firm and its partners have no separate legal existence. The profits are shared by the partners. With respect to losses, the liability of the partners is unlimited. A firm has a limited life span and must be dissolved when any one of the partners dies, retires, claims bankruptcy or goes insane.

Limited Liability Partnership (LLP)

In a Limited Liability Partnership or LLP, the partners of the firm enjoy perpetual existence as well as the advantage of limited liability. Each partner's liability is limited to their agreed contribution to the LLP. The partnership and its partners have a separate legal existence.

Tips



- Learn from others' failures.
- Be certain that this is what you want.
- Search for a problem to solve, rather than look for a problem to attach to your idea.

8.5.2 Leadership & Teamwork: Leadership and Leaders

Leadership means setting an example for others to follow. Setting a good example means not asking someone to do something that you wouldn't willingly want to do yourself. Leadership is about figuring out what to do in order to win as a team, and as a company.

Leaders believe in doing the right things. They also believe in helping others to do the right things. An effective leader is someone who:

- Creates an inspiring vision of the future.
- Motivates and inspires his team to pursue that vision.

8.5.2.1 Leadership Qualities That All Entrepreneurs Need

Building a successful enterprise is only possible if the entrepreneur in charge possesses excellent leadership qualities. Some critical leadership skills that every entrepreneur must have are:

- 1. **Pragmatism:** This means having the ability to highlight all obstacles and challenges, in order to resolve issues and reduce risks.
- 2. **Humility:** This means admitting to mistakes often and early, and being quick to take responsibility for your actions. Mistakes should be viewed as challenges to overcome, not opportunities to point blame.
- 3. **Flexibility:** It is critical for a good leader to be very flexible and quickly adapt to change. It is equally critical to know when to adapt and when not to.
- 4. **Authenticity:** This means showing both, your strengths and your weaknesses. It means being human and showing others that you are human.
- 5. **Reinvention:** This means refreshing or changing your leadership style when necessary. To do this, it's important to learn where your leadership gaps lie and find out what resources are required to close them.
- 6. **Awareness:** This means taking the time to recognize how others view you. It means understanding how your presence affects those around you.

-8.5.2.2 Benefits of Effective Leadership

Effective leadership results in numerous benefits. Great leadership leads to the leader successfully:

- Gaining the loyalty and commitment of the team members
- Motivating the team to work towards achieving the company's goals and objectives
- Building morale and instilling confidence in the team members
- Fostering mutual understanding and team-spirit among team members
- Convincing team members about the need to change when a situation requires adaptability

8.5.2.3 Teamwork and Teams

Teamwork occurs when the people in a workplace combine their individual skills to pursue a common goal. Effective teams are made up of individuals who work together to achieve this common goal. A great team is one who holds themselves accountable for the end result.

8.5.2.4 Importance of Teamwork in Entrepreneurial Success

For an entrepreneurial leader, building an effective team is critical to the success of a venture. An entrepreneur must ensure that the team he builds possesses certain crucial qualities, traits and characteristics. An effective team is one which has:

- 1. **Unity of purpose:** All the team members should clearly understand and be equally committed to the purpose, vision and goals of the team.
- 2. **Great communication skills:** Team members should have the ability to express their concerns, ask questions and use diagrams, and charts to convey complex information.
- 3. **The ability to collaborate:** Every member should feel entitled to provide regular feedback on new ideas.
- 4. **Initiative:** The team should consist of proactive individuals. The members should have the enthusiasm to come up with new ideas, improve existing ideas, and conduct their own research.
- 5. **Visionary members:** The team should have the ability to anticipate problems and act on these potential problems before they turn into real problems.
- 6. **Great adaptability skills:** The team must believe that change is a positive force. Change should be seen as the chance to improve and try new things.
- 7. **Excellent organizational skills:** The team should have the ability to develop standard work processes, balance responsibilities, properly plan projects, and set in place methods to measure progress and ROI.

Tips



- Don't get too attached to your original idea. Allow it to evolve and change.
- Be aware of your weaknesses and build a team that will complement your shortfalls.
- Hiring the right people is not enough. You need to promote or incentivize your most talented people to keep them motivated.
- Earn your team's respect.

8.5.3 Communication Skills

Listening is the ability to correctly receive and understand messages during the process of communication. Listening is critical for effective communication. Without effective listening skills, messages can easily be misunderstood. This results in a communication breakdown and can lead to the sender and the receiver of the message becoming frustrated or irritated.

It's very important to note that listening is not the same as hearing. Hearing just refers to sounds that you hear. Listening is a whole lot more than that. To listen, one requires focus. It means not only paying attention to the story, but also focusing on how the story is relayed, the way language and voice is used, and even how the speaker uses their body language. The ability to listen depends on how effectively one can perceive and understand both, verbal and non-verbal cues.

8.5.3.1 How to Listen Effectively?

To listen effectively you should:

- Stop talking
- Stop interrupting
- Focus completely on what is being said
- Nod and use encouraging words and gestures
- Be open-minded
- Think about the speaker's perspective
- Be very, very patient
- Pay attention to the tone that is being used
- Pay attention to the speaker's gestures, facial expressions and eye movements
- Not try and rush the person
- Not let the speaker's mannerisms or habits irritate or distract you

8.5.3.2 The Importance of Speaking Effectively

How successfully a message gets conveyed depends entirely on how effectively you are able to get it through. An effective speaker is one who enunciates properly, pronounces words correctly, chooses the right words and speaks at a pace that is easily understandable. Besides this, the words spoken out loud need to match the gestures, tone and body language used.

What you say, and the tone in which you say it, results in numerous perceptions being formed. A person who speaks hesitantly may be perceived as having low self-esteem or lacking in knowledge of the discussed topic. Those with a quiet voice may very well be labelled as shy. And those who speak in commanding tones with high levels of clarity, are usually considered to be extremely confident. This makes speaking a very critical communication skill.

8.5.3.3 How to Speak Effectively?

To speak effectively you should:

- Incorporate body language in your speech like eye contact, smiling, nodding, gesturing etc.
- Build a draft of your speech before actually making your speech.
- Ensure that all your emotions and feelings are under control.
- Pronounce your words distinctly with the correct pitch and intensity. Your speech should
 be crystal clear at all times. Use a pleasant and natural tone when speaking. Your
 audience should not feel like you are putting on an accent or being unnatural in any way.
- Use precise and specific words to drive your message home. Ambiguity should be avoided at all costs.
- Ensure that your speech has a logical flow.

- Be brief. Don't add any unnecessary information.
- Make a conscious effort to avoid irritating mannerisms like fidgeting, twitching etc.
- Choose your words carefully and use simple words that the majority of the audience will have no difficulty understanding.
- Use visual aids like slides or a whiteboard.
- Speak slowly so that your audience can easily understand what you're saying. However, be careful not to speak too slowly because this can come across as stiff, unprepared or even condescending.
- Remember to pause at the right moments.

Tips



- If you're finding it difficult to focus on what someone is saying, try repeating their words in your head.
- Always maintain eye contact with the person that you are communicating with, when speaking as well as listening. This conveys and also encourages interest in the conversation.

-8.5.4 Problem Solving & Negotiation Skills

As per The Concise Oxford Dictionary (1995), a problem is, "A doubtful or difficult matter requiring a solution"

All problems contain two elements:

- 1. Goals
- 2. Obstacles

The aim of problem solving is to recognize the obstacles and remove them in order to achieve the goals.

8.5.4.1 How to Solve Problems?

Solving a problem requires a level of rational thinking. Here are some logical steps to follow when faced with an issue:

- Step 1: Identify the problem
- Step 2: Study the problem in detail
- Step 3: List all possible solutions
- Step 4: Select the best solution
- Step 5: Implement the chosen solution
- Step 6: Check that the problem has really been solved

8.5.4.2 Important Traits for Problem Solving

Highly developed problem-solving skills are critical for both, business owners and their employees. The following personality traits play a big role in how effectively problems are solved:

- Being open minded
- Asking the right questions
- Being proactive
- Not panicking
- Having a positive attitude
- Focusing on the right problem

8.5.4.3 How to Assess for Problem Solving Skills?

As an entrepreneur, it would be a good idea to assess the level of problem solving skills of potential candidates before hiring them. Some ways to assess this skill are through:

- 1. **Application forms:** Ask for proof of the candidate's problem solving skills in the application form.
- 2. **Psychometric tests:** Give potential candidates logical reasoning and critical thinking tests and see how they fare.
- 3. **Interviews:** Create hypothetical problematic situations or raise ethical questions and see how the candidates respond.
- 4. **Technical questions:** Give candidates examples of real life problems and evaluate their thought process.

8.5.4.4 What is Negotiation?

Negotiation is a method used to settle differences. The aim of negotiation is to resolve differences through a compromise or agreement while avoiding disputes. Without negotiation, conflicts are likely to lead to resentment between people. Good negotiation skills help satisfy both parties and go a long way towards developing strong relationships.

Why Negotiate?

Starting a business requires many, many negotiations. Some negotiations are small while others are critical enough to make or break a start-up. Negotiation also plays a big role inside the workplace. As an entrepreneur, you need to know not only know how to negotiate yourself, but also how to train employees in the art of negotiation.

How to Negotiate?

Take a look at some steps to help you negotiate:

- Step 1: Pre-Negotiation Preparation: Agree on where to meet to discuss the problem, decide who all will be present and set a time limit for the discussion.
- Step 2: Discuss the problem: This involves asking questions, listening to the other side, putting your views forward and clarifying doubts.
- Step 3: Clarify the Objective: Ensure that both parties want to solve the same problem and reach the same goal.
- Step 4: Aim for a Win-Win Outcome: Try your best to be open minded when negotiating. Compromise and offer substitute solutions to arrive at an outcome where both win.
- Step 5: Clearly Define the Agreement: When an agreement has been reached, the details of the agreement should be crystal clear to both sides, with no scope for misunderstandings.
- Step 6: Implement the Agreed Upon Solution: Agree on a course of action to set the solution in motion.

Tips



- Know exactly what you want before you work towards getting it
- Give more importance to listening and thinking, than speaking
- Focus on building a relationship rather than winning
- Remember that your people skills will affect the outcome
- Know when to walk away sometimes reaching an agreement may not be possible

8.5.5 Business Opportunities Identification

"The entrepreneur always searches for change, responds to it and exploits it as an opportunity."

Peter Drucker

The ability to find good business opportunities is an important characteristic of an entrepreneur.

What is an Opportunity?

The word opportunity suggests a good chance or a favourable situation to do something offered by circumstances.

A business opportunity is typically a good/favourable change that can be used to run a business in a given environment, at a given point of time.

Common Questions Faced by Entrepreneurs

A critical question that all entrepreneurs face is how to go about finding the business opportunity that is right for them.

Some common questions that entrepreneurs constantly think about are:

- Should the new enterprise introduce a new product or service based on an unmet need?
- Should the new enterprise select an existing product or service from one market and offer it in another where it may not be available?
- Should the enterprise be based on a tried and tested formula that has worked elsewhere?

It is therefore extremely important that entrepreneurs must learn how to identify new and existing business opportunities and evaluate their chances of success.

When is an Idea an Opportunity?

An idea is an opportunity when:

- It creates or adds value to a customer
- It solves a significant problem, removes a pain point or meets a demand
- Has a robust market and profit margin
- Is a good fit with the founder and management team at the right time and place

Factors to Consider When Looking for Opportunities

Consider the following when looking for business opportunities:

- Economic trends
- Changes in funding
- Changing relationships between vendors, partners and suppliers
- Market trends
- Changes in political support
- Shift in target audience

Ways to Identify New Business Opportunities

- **Identify Market Inefficiencies:** When looking at a market, consider what inefficiencies are present in the market. Think about ways to correct these inefficiencies.
- **Remove Key Hassles:** Rather than create a new product or service, you can innovatively improve a product, service or process.
- **Create Something New:** Think about how you can create a new experience for customers, based on existing business models.
- **Pick a Growing Sector/Industry:** Research and find out which sectors or industries are growing and think about what opportunities you can tap in the same.
- Think About Product Differentiation: If you already have a product in mind, think about ways to set it apart from the existing ones.

Ways to Identify Business Opportunities within Your Business

1. SWOT Analysis

An excellent way to identify opportunities inside your business is by creating a SWOT analysis. The acronym SWOT stands for strengths, weaknesses, opportunities, and threats. SWOT analysis framework:

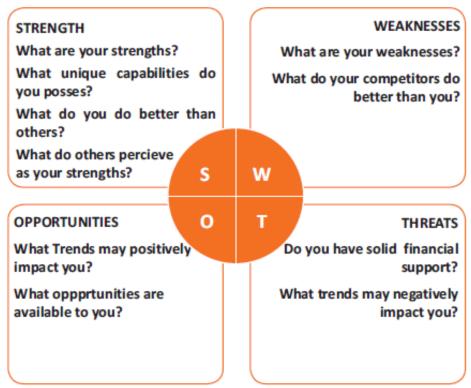


Fig.8.5.1. SWOT Analysis

Consider the following when looking for business opportunities:

By looking at yourself and your competitors using the SWOT framework, you can uncover opportunities that you can exploit, as well as manage and eliminate threats that could derail your success.

2. Establishing Your USP

Establish your USP in such a way that positions you differently from your competitors. Identify the uniqueness about your product that will motivate customers to buy from you and then promote that reason.

Opportunity Analysis

Once you have identified an opportunity, you need to analyse it. To analyse an opportunity, you must:

- Focus on the idea
- Focus on the market of the idea
- Talk to industry leaders in the same space as the idea
- Talk to players in the same space as the idea

Tips



- Remember, opportunities are situational.
- Look for a proven track record.
- Avoid the latest craze.
- Love your idea.

8.5.6 Entrepreneurship Support Eco-System

An entrepreneur is a person who:

- Does not work for an employee
- Runs a small enterprise
- Assumes all the risks and rewards of the enterprise, idea, good or service

Types of Entrepreneurs

There are four main types of entrepreneurs:

- 1. **The Traditional Entrepreneur:** This type of entrepreneur usually has some kind of skill they can be a carpenter, mechanic, cook etc. They have businesses that have been around for numerous years like restaurants, shops and carpenters. Typically, they gain plenty of experience in a particular industry before they begin their own business in a similar field.
- 2. **The Growth Potential Entrepreneur:** The desire of this type of entrepreneur is to start an enterprise that will grow, win many customers and make lots of money. Their ultimate aim is to eventually sell their enterprise for a nice profit. Such entrepreneurs usually have a science or technical background.
- 3. **The Project-Oriented Entrepreneur:** This type of entrepreneur generally has a background in the Arts or psychology. Their enterprises tend to be focus on something that they are very passionate about.
- 4. **The Lifestyle Entrepreneur:** This type of entrepreneur has usually worked as a teacher or a secretary. They are more interested in selling something that people will enjoy, rather than making lots of money.

Characteristics of an Entrepreneur

Successful entrepreneurs have the following characteristics:

- They are highly motivated
- They are creative and persuasive
- They are mentally prepared to handle each and every task
- They have excellent business skills they know how to evaluate their cash flow, sales and revenue

- They are willing to take great risks
- They are very proactive this means they are willing to do the work themselves, rather than wait for someone else to do it
- They have a vision they are able to see the big picture
- They are flexible and open-minded
- They are good at making decisions

8.5.6.1 Entrepreneur Success Stories

Dhiru Bhai Ambani

Dhirubhai Ambani began his entrepreneurial career by selling "bhajias" to pilgrims in Mount Girnar on weekends. At 16, he moved to Yemen where he worked as a gas-station attendant, and as a clerk in an oil company. He returned to India with Rs. 50,000 and started a textile trading company. Reliance went on to become the first Indian company to raise money in global markets and the first Indian company to feature in Forbes 500 list.

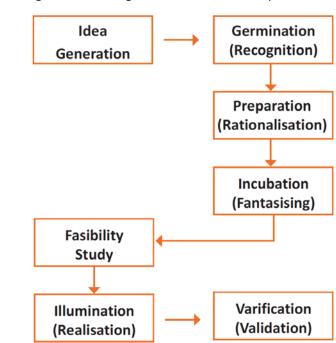
Dr. Karsanbhai Patel

Karsanbhai Patel made detergent powder in the backyard of his house. He sold his product door-to door and offered a money back guarantee with every pack that was sold. He charged Rs.3 per kg when the cheapest detergent at that time was Rs.13 per kg. Dr. Patel eventually started Nirma which became a whole new segment in the Indian domestic detergent market.

8.5.6.2 The Entrepreneurial Process

Let's take a look at the stages of the entrepreneurial process.

- **Stage 1:** Idea Generation. The entrepreneurial process begins with an idea that has been thought of by the entrepreneur. The idea is a problem that has the potential to be solved.
- **Stage 2:** Germination or Recognition. In this stage a possible solution to the identified problem is thought of.
- **Stage 3:** Preparation or Rationalization. The problem is studied further and research is done to find out how others have tried to solve the same problem.
- **Stage 4:** Incubation or Fantasizing. This stage involves creative thinking for the purpose of coming up with more ideas. Less thought is given to the problem areas.
- **Stage 5:** Feasibility Study: The next step is the creation of a feasibility study to determine if the idea will make a profit and if it should be seen through.
- **Stage 6:** Illumination or Realization. This is when all uncertain areas suddenly become clear. The entrepreneur feels confident that his idea has merit.
- **Stage 7:** Verification or Validation. In this final stage, the idea is verified to see if it works and if it is useful.



Take a look at the diagram below to get a better idea of this process.

Fig.8.5.2: Stages of the entrepreneurial process

8.5.6.3 What is an Entrepreneur?

The entrepreneurship support ecosystem signifies the collective and complete nature of entrepreneurship. New companies emerge and flourish not only because of the courageous, visionary entrepreneurs who launch them, but they thrive as they are set in an environment or 'ecosystem' made of private and public participants. These players nurture and sustain the new ventures, facilitating the entrepreneurs' efforts. An entrepreneurship ecosystem comprises of the following six domains:

- 1. **Favourable Culture:** This includes elements such as tolerance of risk and errors, valuable networking and positive social standing of the entrepreneur.
- 2. **Facilitating Policies & Leadership:** This includes regulatory framework incentives and existence of public research institutes.
- 3. **Financing Options:** Angel financing, venture capitalists and micro loans would be good examples of this.
- 4. **Human Capital:** This refers to trained and untrained labour, entrepreneurs and entrepreneurship training programmes, etc.
- 5. **Conducive Markets for Products & Services:** This refers to an existence or scope of existence of a market for the product/service.
- 6. **Institutional & Infrastructural Support:** This includes legal and financing advisers, telecommunications, digital and transportation infrastructure, and entrepreneurship networking programmes.

These domains indicate whether there is a strong entrepreneurship support ecosystem and what actions should the government put in place to further encourage this ecosystem.

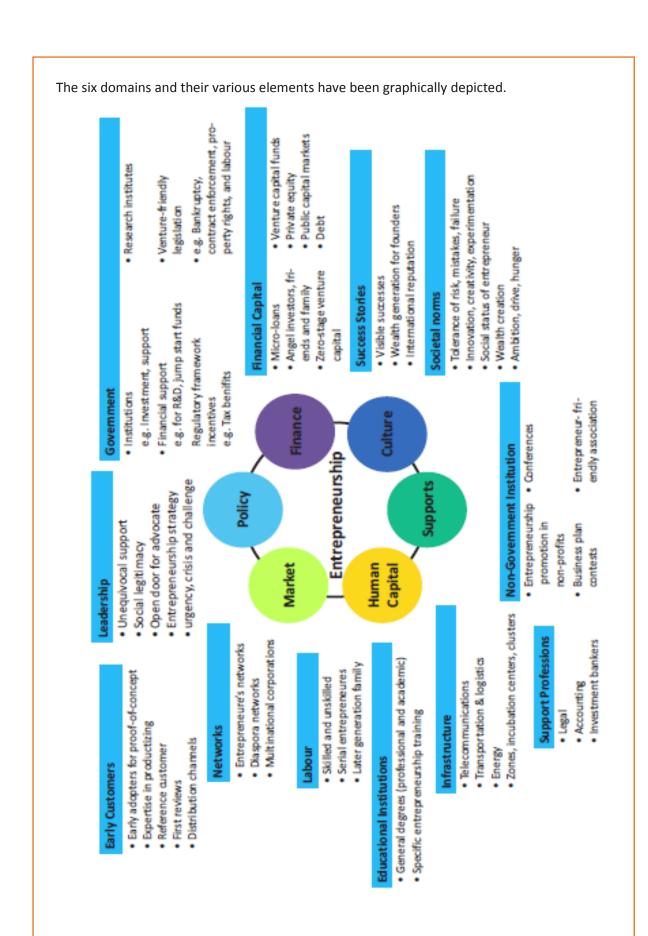


Fig.8.5.3. Entrepreneurship at a Glance

Every entrepreneurship support ecosystem is unique and all the elements of the ecosystem are interdependent. Although every region's entrepreneurship ecosystem can be broadly described by the above features, each ecosystem is the result of the hundred elements interacting in highly complex and particular ways.

Entrepreneurship ecosystems eventually become (largely) self-sustaining. When the six domains are resilient enough, they are mutually beneficial. At this point, government involvement can and should be significantly minimized. Public leaders do not need to invest a lot to sustain the ecosystem. It is imperative that the entrepreneurship ecosystem incentives are formulated to be self-liquidating, hence focusing on sustain ability of the environment.

8.5.6.4 Government's Role in the Entrepreneurship Ecosystem

Encouraging new ventures is a major focus for policymakers. Governments across the world are recognizing that new businesses flourish in distinctive types of supportive environments. Policymakers should study the scenario and take into account the following points whilst they formulate policies and regulations that enable successful entrepreneurship support ecosystems.

- Policymakers should avoid regulations that discourage new entrants and work towards building efficient methods for business startups. Policies and regulations which help existing, leading firms over entrepreneurial ventures, limit competition and obstruct growth/formation of new companies.
- Therefore, in place of developing policies that are intended to improve market failures, policymakers should interact with entrepreneurs and understand the challenges faced by them. The feedback is used to develop policies which encourage exploring ideas, developing new products and increase the rates of deal flow.
- Entrepreneurial supporters ideally need to create a database that enables identifying who the members in the ecosystem are and how they are connected. The ecosystem database are useful tools in developing engagement strategies.
- Disruptions are inevitable in economic as well as social life. However, it's important to
 note that economic disruption gives rise to entrepreneurial opportunities. Architects of
 the entrepreneurship ecosystems (entrepreneurs, mentors, policymakers and
 consumers,) should anticipate these dips, thus capitalizing on the opportunities they
 create.

8.5.6.5 Snapshot of the Entrepreneurship Ecosystem in India

Entrepreneurship has earned a newfound respect in India. Many Indians, with exposure to the world of business, who traditionally would have opted for a job, are setting up their own ventures. Many elements of the entrepreneurship ecosystem are beginning to come together. For example, increase in venture capitalists, government schemes and incubators, academia industry linkages, and emerging clusters and support to rural economy.

All these initiatives are effective but there is a need to scale up and enrich the ecosystem further in the following ways:

- 1. We need to review our attitude towards failures and accept them as learning experiences.
- 2. We must encourage the educated to become entrepreneurs and provide students in schools and colleges with entrepreneurship skills.
- 3. Universities, research labs and the government need to play the role of enablers in the entrepreneurship support ecosystem.
- 4. Policymakers need to focus on reducing the obstacles such as corruption, red tape and bureaucracy.
- 5. We need to improve our legal systems and court international venture capital firms and bring them to India.
- 6. We must devise policies and methods to reach the secondary and tertiary towns in India, where people do not have access to the same resources available in the cities.

Today, there is a huge opportunity in this country to introduce innovative solutions that are capable of scaling up, and collaborating within the ecosystem as well as enriching it.

8.5.6.6 Make in India Campaign

Every entrepreneur has certain needs. Some of their important needs are:

- To easily get loans
- To easily find investors
- To get tax exemptions
- To easily access resources and good infrastructure
- To enjoy a procedure that is free of hassles and is quick
- To be able to easily partner with other firms

The Make in India campaign, launched by Prime Minister Modi aims to satisfy all these needs of young, aspiring entrepreneurs. Its objective is to:

- Make investment easy
- Support new ideas
- Enhance skill development
- Safeguard the ideas of entrepreneurs
- Create state-of-the-art facilities for manufacturing goods

-Tips 🖳

- Research the existing market, network with other entrepreneurs, venture capitalists, angel investors, and thoroughly review the policies in place to enable your entrepreneurship.
- Failure is a stepping stone and not the end of the road. Review yours and your peers' errors and correct them in your future venture.

• Be proactive in your ecosystem. Identify the key features of your ecosystem and enrich them to ensure self-sustainability of your entrepreneurship support ecosystem.

8.5.7 Risk Appetite & Resilience

Entrepreneurship and Risk

Entrepreneurs are inherently risk takers. They are path-makers not path-takers. Unlike a normal, cautious person, an entrepreneur would not think twice about quitting his job (his sole income) and taking a risk on himself and his idea.

An entrepreneur is aware that while pursuing his dreams, assumptions can be proven wrong and unforeseen events may arise. He knows that after dealing with numerous problems, success is still not guaranteed. Entrepreneurship is synonymous with the ability to take risks. This ability, called risk-appetite, is an entrepreneurial trait that is partly genetic and partly acquired.

What is Risk Appetite?

Risk appetite is defined as the extent to which a company is equipped to take risk, in order to achieve its objectives. Essentially, it refers to the balance, struck by the company, between possible profits and the hazards caused by changes in the environment (economic ecosystem, policies, etc.). Taking on more risk may lead to higher rewards but have a high probability of losses as well. However, being too conservative may go against the company as it can miss out on good opportunities to grow and reach their objectives.

The levels of risk appetite can be broadly categorized as "low", "medium" and "high." The company's entrepreneur(s) need to assess all possible alternatives and choose the option most likely to succeed. Companies have varying levels of risk appetites for different objectives. The levels depend on:

- The type of industry
- Market pressures
- Company objectives

For example, a start-up with a revolutionary concept will have a very high risk appetite. The start-up can afford short term failures before it achieves longer term success. This type of appetite will not remain constant and will be adjusted to account for the present circumstances of the company.

Risk Appetite Statement

Companies have to define and articulate their risk appetite in sync with decisions made about their objectives and opportunities. The point of having a risk appetite statement is to have a framework that clearly states the acceptance and management of risk in business. It sets risk taking limits within the company. The risk appetite statement should convey the following:

- The nature of risks the business faces.
- Which risks the company is comfortable taking on and which risks are unacceptable.
- How much risk to accept in all the risk categories.
- The desired trade-off between risk and reward.

• Measures of risk and methods of examining and regulating risk exposures.

Entrepreneurship and Resilience

Entrepreneurs are characterized by a set of qualities known as resilience. These qualities play an especially large role in the early stages of developing an enterprise. Risk resilience is an extremely valuable characteristic as it is believed to protect entrepreneurs against the threat of challenges and changes in the business environment.

What is Entrepreneurial Resilience?

Resilience is used to describe individuals who have the ability to overcome setbacks related to their life and career aspirations. A resilient person is someone who is capable of easily and quickly recovering from setbacks. For the entrepreneur, resilience is a critical trait. Entrepreneurial resilience can be enhanced in the following ways:

- By developing a professional network of coaches and mentors
- By accepting that change is a part of life
- By viewing obstacles as something that can be overcome

Characteristics of a Resilient Entrepreneur

The characteristics required to make an entrepreneur resilient enough to go the whole way in their business enterprise are:

- A strong internal sense of control
- Ability to diversify and expand
- Strong social connections
- Survivor attitude
- Skill to learn from setbacks
- Cash-flow conscious habits
- Ability to look at the bigger picture
- Attention to detail

Tips



- Cultivate a great network of clients, suppliers, peers, friends and family. This will not
 only help you promote your business, but will also help you learn, identify new
 opportunities and stay tuned to changes in the market.
- Don't dwell on setbacks. Focus on what you need to do next to get moving again.
- While you should try, and curtail expenses, ensure that it is not at the cost of your growth.

8.5.8 Success & Failures

Understanding Successes and Failures in Entrepreneurship

Shyam is a famous entrepreneur, known for his success story. But what most people don't know, is that Shyam failed numerous times before his enterprise became a success. Read his interview to get an idea of what entrepreneurship is really about, straight from an entrepreneur who has both, failed and succeeded.

Interviewer: Shyam, I have heard that entrepreneurs are great risk-takers who are never afraid of failing. Is this true?

Shyam: Ha ha, no of course it's not true! Most people believe that entrepreneurs need to be fearlessly enthusiastic. But the truth is, fear is a very normal and valid human reaction, especially when you are planning to start your own business! In fact, my biggest fear was the fear of failing. The reality is, entrepreneurs fail as much as they succeed. The trick is to not allow the fear of failing to stop you from going ahead with your plans. Remember, failures are lessons for future success!

Interviewer: What, according to you, is the reason that entrepreneurs fail?

Shyam: Well, there is no one single reason why entrepreneurs fail. An entrepreneur can fail due to numerous reasons. You could fail because you have allowed your fear of failure to defeat you. You could fail because you are unwilling to delegate (distribute) work. As the saying goes, "You can do anything, but not everything!" You could fail because you gave up too easily — maybe you were not persistent enough. You could fail because you were focusing your energy on small, insignificant tasks and ignoring the tasks that were most important. Other reasons for failing are partnering with the wrong people, not being able to sell your product to the right customers at the right time at the right price... and many more reasons!

Interviewer: As an entrepreneur, how do you feel failure should be looked at?

Shyam: I believe we should all look at failure as an asset, rather than as something negative. The way I see it, if you have an idea, you should try to make it work, even if there is a chance that you will fail. That's because not trying is failure right there, anyway! And failure is not the worst thing that can happen. I think having regrets because of not trying, and wondering 'what if' is far worse than trying and actually failing.

Interviewer: How did you feel when you failed for the first time?

Shyam: I was completely heartbroken! It was a very painful experience. But the good news is, you do recover from the failure. And with every subsequent failure, the recovery process gets a lot easier. That's because you start to see each failure more as a lesson that will eventually help you succeed, rather than as an obstacle that you cannot overcome. You will start to realize that failure has many benefits.

Interviewer: Can you tell us about some of the benefits of failing?

Shyam: One of the benefits that I have experienced personally from failing is that the failure made me see things in a new light. It gave me answers that I didn't have before. Failure can make you a lot stronger. It also helps keep your ego in control.

Interviewer: What advice would you give entrepreneurs who are about to start their own enterprises?

Shyam: I would tell them to do their research and ensure that their product is something that is actually wanted by customers. I'd tell them to pick their partners and employees very wisely and cautiously. I'd tell them that it's very important to be aggressive — push and market your product as aggressively as possible. I would warn them that starting an enterprise is very expensive and that they should be prepared for a situation where they run out of money. I would tell them to create long term goals and put a plan in action to achieve that goal. I would tell them to build a product that is truly unique. Be very careful and ensure that you are not copying another start-up. Lastly, I'd tell them that it's very important that they find the right investors.

Interviewer: That's some really helpful advice, Shyam! I'm sure this will help all entrepreneurs to be more prepared before they begin their journey! Thank you for all your insight!

Tips



- Remember that nothing is impossible.
- Identify your mission and your purpose before you start.
- Plan your next steps don't make decisions hastily.

UNIT 8.6: Preparing to be an Entrepreneur

Unit Objectives



At the end of this unit, you will be able to:

- 1. Discuss how market research is carried out
- 2. Describe the 4 Ps of marketing
- 3. Discuss the importance of idea generation
- 4. Recall basic business terminology
- 5. Discuss the need for CRM
- 6. Discuss the benefits of CRM
- 7. Discuss the need for networking
- 8. Discuss the benefits of networking
- 9. Discuss the importance of setting goals
- 10. Differentiate between short-term, medium-term and long-term goals
- 11. Discuss how to write a business plan
- 12. Explain the financial planning process
- 13. Discuss ways to manage your risk
- 14. Describe the procedure and formalities for applying for bank finance
- 15. Discuss how to manage your own enterprise
- 16. List important questions that every entrepreneur should ask before starting an enterprise

-8.6.1 Market Study/The 4 Ps of Marketing/Importance of an-**IDEA**

Understanding Market Research

Market research is the process of gathering, analysing and interpreting market information on a product or service that is being sold in that market. It also includes information on:

- Past, present and prospective customers
- Customer characteristics and spending habits
- The location and needs of the target market
- The overall industry
- Relevant competitors

Market research involves two types of data:

- **Primary information.** This is research collected by yourself or by someone hired by you.
- Secondary information. This is research that already exists and is out there for you to find and use.

Primary research

Primary research can be of two types:

- Exploratory: This is open-ended and usually involves detailed, unstructured interviews.
- Specific: This is precise and involves structured, formal interviews. Conducting specific

Secondary research

Secondary research uses outside information. Some common secondary sources are:

- **Public sources:** These are usually free and have a lot of good information. Examples are government departments, business departments of public libraries etc.
- **Commercial sources:** These offer valuable information but usually require a fee to be paid. Examples are research and trade associations, banks and other financial institutions etc.
- **Educational institutions:** These offer a wealth of information. Examples are colleges, universities, technical institutes etc.

8.6.1.1 The 4 Ps of Marketing

The 4 Ps of marketing are Product, Price, Promotion and Place.

Let's look at each of these 4 Ps in detail.

Product

A product can be tangible, like a good or intangible, like a service.

Whatever your product is, it is critical that you have a clear understanding of what you are offering, and what its unique characteristics are, before you begin with the marketing process.

Some questions to ask yourself are:

- What need does the customer have for the product/service?
- What needs does it satisfy?
- Are there any more features that can be added?
- Does it have any expensive and unnecessary features?
- How will customers use it?
- What should it be called?
- How is it different from similar products?
- How much will it cost to produce?
- Can it be sold at a profit?

Price

Once all the elements of Product have been established, the Price factor needs to be considered. The Price of a Product will depend on several factors such as profit margins, supply, demand and the marketing strategy.

Some typical questions to ask yourself include:

- What is the value of the product/service to customers?
- Do local products/services have established price points?
- Is the customer price sensitive?
- Should discounts be offered?
- How is your price compared to that of your competitors?

Promotion

Once you are certain about your Product and your Price, the next step is to look at ways to promote it. Some key elements of promotion are advertising, public relations, social media marketing, email marketing, search engine marketing, video marketing and more.

Some questions to ask yourself are:

- Where should you promote your product or service?
- What is the best medium to use to reach your target audience
- When would be the best time to promote your product?
- How are your competitors promoting their products?

Place

According to most marketers, the basis of marketing is about offering the right product, at the right price, at the right place, at the right time. For this reason, selecting the best possible location is critical for converting prospective clients into actual clients.

Some questions to ask yourself are:

- Will your product or service be looked for in a physical store, online or both?
- What should you do to access the most appropriate distribution channels?
- Will you require a sales force?
- Where are your competitors offering their products or services?
- Should you follow in your competitors' footsteps?
- Should you do something different from your competitors?

Importance of an IDEA

Ideas are the foundation of progress. An idea can be small or ground-breaking, easy to accomplish or extremely complicated to implement. Whatever the case, the fact that it is an idea gives it merit. Without ideas, nothing is possible. Most people are afraid to speak out their ideas, out for fear of being ridiculed. However, if are an entrepreneur and want to remain competitive and innovative, you need to bring your ideas out into the light.

Some ways to do this are by:

- Establishing a culture of brainstorming where you invite all interested parties to contribute
- Discussing ideas out loud so that people can add their ideas, views, opinions to them

- Being open minded and not limiting your ideas, even if the idea who have seems ridiculous
- Not discarding ideas that you don't work on immediately, but instead making a note of them and shelving them so they can be revisited at a later date.

Tips



- Keep in mind that good ideas do not always have to be unique.
- Remember that timing plays a huge role in determining the success of your idea.
- Situations and circumstances will always change, so be flexible and adapt your idea accordingly.

8.6.2 Business Entity Concepts: Basic Business Terminology

If your aim is to start and run a business, it is crucial that you have a good understanding of basic business terms. Every entrepreneur should be well versed in the following terms:

- **Accounting:** A systematic method of recording and reporting financial transactions.
- Accounts payable: Money owed by a company to its creditors.
- Accounts Receivable: The amount a company is owed by its clients.
- Assets: The value of everything a company owns and uses to conduct its business.
- **Balance Sheet:** A snapshot of a company's assets, liabilities and owner's equity at a given moment.
- **Bottom Line:** The total amount a business has earned or lost at the end of a month.
- **Business:** An organization that operates with the aim of making a profit.
- Business to Business (B2B): A business that sells goods or services to another business.
- **Business to Consumer (B2C):** A business that sells goods or services directly to the end user.
- **Capital:** The money a business has in its accounts, assets and investments. The two main types of capital are debt and equity.
- Cash Flow: The overall movement of funds through a business each month, including income and expenses.
- **Cash Flow Statement:** A statement showing the money that entered and exited a business during a specific period of time.
- **Contract:** A formal agreement to do work for pay.
- **Depreciation:** The degrading value of an asset over time.
- **Expense:** The costs that a business incurs through its operations.
- **Finance:** The management and allocation of money and other assets.
- Financial Report: A comprehensive account of a business' transactions and expenses.
- **Fixed Cost:** A one-time expense.

- **Income Statement (Profit and Loss Statement):** Shows the profitability of a business during a period of time.
- Liabilities: The value of what a business owes to someone else.
- Marketing: The process of promoting, selling and distributing a product or service.
- Net Income/Profit: Revenues minus expenses.
- Net Worth: The total value of a business.
- Payback Period: The amount of time it takes to recover the initial investment of a business.
- **Profit Margin:** The ratio of profit, divided by revenue, displayed as a percentage.
- **Return on Investment (ROI):** The amount of money a business gets as return from an investment.
- Revenue: The total amount of income before expenses are subtracted.
- Sales Prospect: A potential customer.
- **Supplier:** A provider of supplies to a business.
- Target Market: A specific group of customers at which a company's products and services are aimed.
- Valuation: An estimate of the overall worth of the business.
- Variable Cost: Expenses that change in proportion to the activity of a business.
- Working Capital: Calculated as current assets minus current liabilities.

8.6.3 CRM & Networking

What is CRM?

CRM stands for Customer Relationship Management. Originally the expression Customer Relationship Management meant managing one's relationship with customers. However, today it refers to IT systems and software designed to help companies manage their relationships.

The Need for CRM

The better a company can manage its relationships with its customers, the higher the chances of the company's success. For any entrepreneur, the ability to successfully retain existing customers and expand the enterprise is paramount. This is why IT systems that focus on addressing the problems of dealing with customers on a daily basis are becoming more and more in demand.

Customer needs change over time, and technology can make it easier to understand what customers really want. This insight helps companies to be more responsive to the needs of their customers. It enables them to modify their business operations when required, so that their customers are always served in the best manner possible. Simply put, CRM helps companies recognize the value of their clients and enables them to capitalize on improved customer relations.

Benefits of CRM

CRM has a number of important benefits:

- It helps improve relations with existing customers which can lead to:
 - o Increased sales
 - Identification of customer needs
 - Cross-selling of products
- It results in better marketing of one's products or services
- · It results in better marketing of one's products or services
- It enhances customer satisfaction and retention
- It improves profitability by identifying and focusing on the most profitable customers

-8.6.3.1 What is Networking? -

In business, networking means leveraging your business and personal connections in order to bring in a regular supply of new business. This marketing method is effective as well as low cost. It is a great way to develop sales opportunities and contacts. Networking can be based on referrals and introductions, or can take place via phone, email, and social and business networking websites.

The Need for Networking

Networking is an essential personal skill for business people, but it is even more important for entrepreneurs. The process of networking has its roots in relationship building. Networking results in greater communication and a stronger presence in the entrepreneurial ecosystem. This helps build strong relationships with other entrepreneurs.

Business networking events held across the globe play a huge role in connecting like-minded entrepreneurs who share the same fundamental beliefs in communication, exchanging ideas and converting ideas into realities. Such networking events also play a crucial role in connecting entrepreneurs with potential investors. Entrepreneurs may have vastly different experiences and backgrounds but they all have a common goal in mind – they all seek connection, inspiration, advice, opportunities and mentors. Networking offers them a platform to do just that.

Benefits of Networking

Networking offers numerous benefits for entrepreneurs. Some of the major benefits are:

- Getting high quality leads
- Increased business opportunities
- Good source of relevant connections
- Advice from like-minded entrepreneurs
- Gaining visibility and raising your profile
- Meeting positive and enthusiastic people

- Increased self-confidence
- Satisfaction from helping others
- Building strong and lasting friendships

Tips



- Use social media interactions to identify needs and gather feedback.
- When networking, ask open-ended questions rather than yes/no type questions.

8.6.4 Business Plan: Why Set Goals?

Setting goals is important because it gives you long-term vision and short-term motivation. Goals can be short term, medium term and long term.

Short-Term Goals

These are specific goals for the immediate future.

Example: Repairing a machine that has failed.

Medium-Term Goals

- These goals are built on your short-term goals.
- They do not need to be as specific as your short-term goals.

Example: Arranging for a service contract to ensure that your machines don't fail again.

Long-Term Goals

These goals require time and planning.

They usually take a year or more to achieve.

Example: Planning your expenses so you can buy new machinery

Why Create a Business Plan?

A business plan is a tool for understanding how your business is put together. It can be used to monitor progress, foster accountable and control the fate of the business. It usually offers a 3-5year projection and outlines the plan that the company intends to follow to grow its revenues. A business plan is also a very important tool for getting the interest of key employees or future investors.

A business plan typically comprises of eight elements.

8.6.4.1 Elements of a Business Plan

Executive Summary

The executive summary follows the title page. The summary should clearly state your desires as the business owner in a short and business like way. It is an overview of your business and your plans. Ideally this should not be more than 1-2 pages.

Your Executive Summary should include:

• The Mission Statement: Explain what your business is all about.

Example: Nike's Mission Statement

Nike's mission statement is "To bring inspiration and innovation to every athlete in the world"

- **Company Information:** Provide information like when your business was formed, the names and roles of the founders, the number of employees, your business location(s) etc.
- **Growth Highlights:** Mention examples of company growth. Use graphs and charts where possible.
- Your Products/Services: Describe the products or services provided.
- Financial Information: Provide details on current bank and investors.
- Summarize future plans: Describe where you see your business in the future.

Business Description

The second section of your business plan needs to provide a detailed review of the different elements of your business. This will help potential investors to correctly understand your business goal and the uniqueness of your offering.

Your Business Description should include:

- A description of the nature of your business
- The market needs that you are aiming to satisfy
- The ways in which your products and services meet these needs
- The specific consumers and organizations that you intend to serve
- Your specific competitive advantages

Market Analysis

The market analysis section usually follows the business description. The aim of this section is to showcase your industry and market knowledge. This is also the section where you should lay down your research findings and conclusions.

Your Market Analysis should include:

- Your industry description and outlook
- Information on your target market
- The needs and demographics of your target audience
- The size of your target market

- The amount of market share you want to capture
- Your pricing structure
- Your competitive analysis
- Any regulatory requirements

Organization & Management

This section should come immediately after the Market Analysis. Your Organization & Management section should include:

- Your company's organizational structure
- Details of your company's ownership
- Details of your management team
- Qualifications of your board of directors
- Detailed descriptions of each division/department and its function
- The salary and benefits package that you offer your people

Service or Product Line

The next section is the service or product line section. This is where you describe your service or product, and stress on their benefits to potential and current customers. Explain in detail why your product of choice will fulfil the needs of your target audience.

Your Service or Product Line section should include:

- A description of your product/service
- A description of your product or service's life cycle
- A list of any copyright or patent filings
- A description of any R&D activities that you are involved in or planning

Marketing & Sales

Once the Service or Product Line section of your plan has been completed, you should start on the description of the marketing and sales management strategy for your business.

Your Marketing section should include the following strategies:

- Market penetration strategy: This strategy focuses on selling your existing products or services in existing markets, in order to increase your market share.
- **Growth strategy:** This strategy focuses on increasing the amount of market share, even if it reduces earnings in the short-term.
- **Channels of distribution strategy:** These can be wholesalers, retailers, distributers and even the internet.
- **Communication strategy:** These can be written strategies (e-mail, text, chat), oral strategies (phone calls, video chats, face-to-face conversations), non-verbal strategies (body language, facial expressions, tone of voice) and visual strategies (signs, webpages, illustrations).

Your Sales section should include the following information:

- A salesforce strategy: This strategy focuses on increasing the revenue of the enterprise.
- A breakdown of your sales activities: This means detailing out how you intend to sell your products or services will you sell it offline or online, how many units do you intend to sell, what price do you plan to sell each unit at, etc.

Funding Request

This section is specifically for those who require funding for their venture. The Funding Request section should include the following information:

- How much funding you currently require.
- How much funding you will require over the next five years. This will depend on your long-term goals.
- The type of funding you want and how you plan to use it. Do you want funding that can be used only for a specific purpose, or funding that can be used for any kind of requirement?
- Strategic plans for the future. This will involve detailing out your long-term plans what these plans are and how much money you will require to put these plans in motions.
- Historical and prospective financial information. This can be done by creating and maintaining all your financial records, right from the moment your enterprise started, to the present day. Documents required for this are your balance sheet which contains details of your company's assets and liabilities, your income statement which lists your company's revenues, expenses and net income for the year, your tax returns (usually for the last three years) and your cash flow budget which lists the cash that came in, the cash that went out and states whether you had a cash deficit (negative balance) or surplus (positive balance) at the end of each month.

Financial Planning

Before you begin building your enterprise, you need to plan your finances. Take a look at the steps for financial planning:

- Step 1: Create a financial plan. This should include your goals, strategies and timelines for accomplishing these goals.
- Step 2: Organize all your important financial documents. Maintain a file to hold your investment details, bank statements, tax papers, credit card bills, insurance papers and any other financial records.
- Step 3: Calculate your net worth. This means figure out what you own (assets like your house, bank accounts, investments etc.), and then subtract what you owe (liabilities like loans, pending credit card amounts etc.) the amount you are left with is your net worth.
- Step 4: Make a spending plan. This means write down in detail where your money will come from, and where it will go.
- Step 5: Build an emergency fund. A good emergency fund contains enough money to cover at least 6 months' worth of expenses.
- Step 6: Set up your insurance. Insurance provides long term financial security and protects you against risk.

Risk Management

As an entrepreneur, it is critical that you evaluate the risks involved with the type of enterprise that you want to start, before you begin setting up your company. Once you have identified potential risks, you can take steps to reduce them. Some ways to manage risks are:

- Research similar business and find out about their risks and how they were minimized.
- Evaluate current market trends and find out if similar products or services that launched a while ago are still being well received by the public.
- Think about whether you really have the required expertise to launch your product or service.
- Examine your finances and see if you have enough income to start your enterprise.
- Be aware of the current state of the economy, consider how the economy may change over time, and think about how your enterprise will be affected by any of those changes.
- Create a detailed business plan.

Tips



- Ensure all the important elements are covered in your plan.
- Scrutinize the numbers thoroughly.
- Be concise and realistic.
- Be conservative in your approach and your projections.
- Use visuals like charts, graphs and images wherever possible.

8.6.5 Procedure and Formalities for Bank Finance

The Need for Bank Finance

For entrepreneurs, one of the most difficult challenges faced involves securing funds for start-ups. With numerous funding options available, entrepreneurs need to take a close look at which funding methodology works best for them. In India, banks are one of the largest funders of start-ups, offering funding to thousands of start-ups every year.

8.6.5.1 What Information Should Entrepreneurs Offer Banks for Funding?

When approaching a bank, entrepreneurs must have a clear idea of the different criteria that banks use to screen, rate and process loan applications. Entrepreneurs must also be aware of the importance of providing banks with accurate and correct information. It is now easier than ever for financial institutions to track any default behaviour of loan applicants. Entrepreneurs looking for funding from banks must provide banks with information relating to their general credentials, financial situation and guarantees or collaterals that can be offered.

General Credentials

This is where you, as an entrepreneur, provide the bank with background information on yourself. Such information includes:

- Letter(s) of Introduction: This letter should be written by a respected business person who knows you well enough to introduce you. The aim of this letter is set across your achievements and vouch for your character and integrity.
- Your Profile: This is basically your resume. You need to give the bank a good idea of your educational achievements, professional training, qualifications, employment record and achievements.
- **Business Brochure:** A business brochure typically provides information on company products, clients, how long the business has been running for etc.
- Bank and Other References: If you have an account with another bank, providing those bank references is a good idea.
- Proof of Company Ownership or Registration: In some cases, you may need to provide
 the bank with proof of company ownership and registration. A list of assets and liabilities
 may also be required.

Financial Situation

Banks will expect current financial information on your enterprise. The standard financial reports you should be prepared with are:

- Balance Sheet
- Cash-Flow Statement
- Business Plan
- Profit-and-Loss Account
- Projected Sales and Revenues
- Feasibility Study

Guarantees or Collaterals

Usually banks will refuse to grant you a loan without security. You can offer assets which the bank can seize and sell off if you do not repay the loan. Fixed assets like machinery, equipment, vehicles etc. are also considered to be security for loans.

-8.6.5.2 The Lending Criteria of Banks

Your request for funding will have a higher chance of success if you can satisfy the following lending criteria:

- Good cash flow
- Adequate shareholders' funds
- Adequate security
- Experience in business
- Good reputation

The Procedure

To apply for funding the following procedure will need to be followed.

- Submit your application form and all other required documents to the bank.
- The bank will carefully assess your credit worthiness and assign ratings by analysing your business information with respect to parameters like management, financial, operational and industry information as well as past loan performance.
- The bank will make a decision as to whether or not you should be given funding.

Tips



- Get advice on funding options from experienced bankers.
- Be cautious and avoid borrowing more than you need, for longer than you need, at an interest rate that is higher than you are comfortable with.

8.6.6 Enterprise Management - An Overview

To manage your enterprise effectively you need to look at many different aspects, right from managing the day-to-day activities to figuring out how to handle a large-scale event. Let's take a look at some simple steps to manage your company effectively.

Step 1: Use your leadership skills and ask for advice when required.

Let's take the example of Ramu, an entrepreneur who has recently started his own enterprise. Ramu has good leadership skills – he is honest, communicates well, knows how to delegate work etc. These leadership skills definitely help Ramu in the management of his enterprise. However, sometimes Ramu comes across situations that he is unsure how to handle. What should Ramu do in this case? One solution is for him to find a more experienced manager who is willing to mentor him. Another solution is for Ramu to use his networking skills so that he can connect with managers from other organizations, who can give him advice on how to handle such situations.

Step 2: Divide your work amongst others — realize that you cannot handle everything yourself.

Even the most skilled manager in the world will not be able to manage every single task that an enterprise will demand of him. A smart manager needs to realize that the key to managing his enterprise lies in his dividing all his work between those around him. This is known as delegation. However, delegating is not enough. A manager must delegate effectively if he wants to see results. This is important because delegating, when done incorrectly, can result in you creating even more work for yourself. To delegate effectively, you can start by making two lists. One list should contain the things that you know you need to handle yourself. The second list should contain the things that you are confident can be given to others to manage and handle.

Besides incorrect delegation, another issue that may arise is over-delegation. This means giving away too many of your tasks to others. The problem with this is, the more tasks you delegate, the more time you will spend tracking and monitoring the work progress of those you have handed the tasks to. This will leave you with very little time to finish your own work.

Step 3: Hire the right people for the job.

Hiring the right people goes a long way towards effectively managing your enterprise. To hire the best people suited for the job, you need to be very careful with your interview process. You should ask potential candidates the right questions and evaluate their answers carefully. Carrying out background checks is always a good practice. Running a credit check is also a good idea, especially if the people you are planning to hire will be handling your money. Create a detailed job description for each role that you want filled and ensure that all candidates have a clear and correct understanding of the job description. You should also have an employee manual in place, where you put down every expectation that you have from your employees. All these actions will help ensure that the right people are approached for running your enterprise.

Step 4: Motivate your employees and train them well.

Your enterprise can only be managed effectively if your employees are motivated to work hard for your enterprise. Part of being motivated involves your employees believing in the vision and mission of your enterprise and genuinely wanting to make efforts towards pursuing the same. You can motivate your employees with recognition, bonuses and rewards for achievements. You can also motivate them by telling them about how their efforts have led to the company's success. This will help them feel pride and give them a sense of responsibility that will increase their motivation. Besides motivating your people, your employees should be constantly trained in new practices and technologies. Remember, training is not a one-time effort. It is a consistent effort that needs to be carried out regularly.

Step 5: Train your people to handle your customers well.

Your employees need to be well-versed in the art of customer management. This means they should be able to understand what their customers want, and also know how to satisfy their needs. For them to truly understand this, they need to see how you deal effectively with customers.

This is called leading by example. Show them how you sincerely listen to your clients and the efforts that you put into understand their requirements. Let them listen to the type of questions that you ask your clients so they understand which questions are appropriate.

Step 6: Market your enterprise effectively.

Also, hire a marketing agency if you feel you need help in this area. Now that you know what is required to run your enterprise effectively, put these steps into play, and see how much easier managing your enterprise becomes!

Tips



- Get advice on funding options from experienced bankers.
- Be cautious and avoid borrowing more than you need, for longer than you need, at an interest rate that is higher than you are comfortable with.

-8.6.7 Considering Entrepreneurship

Questions to ask yourself before considering entrepreneurship.

- 1. Why am I starting a business?
- 2. What problem am I solving?
- 3. Have others attempted to solve this problem before? Did they succeed or fail?
- 4. Do I have a mentor1 or industry expert that I can call on?
- 5. Who is my ideal customer2?
- 6. Who are my competitors3?
- 7. What makes my business idea different from other business ideas?
- 8. What are the key features of my product or service?
- 9. Have I done a SWOT4 analysis?
- 10. What is the size of the market that will buy my product or service?
- 11. What would it take to build a minimum viable product5 to test the market?
- 12. How much money do I need to get started?
- 13. Will I need to get a loan?
- 14. How soon will my products or services be available?
- 15. When will I break even6 or make a profit?
- 16. How will those who invest in my idea make a profit?
- 17. How should I set up the legal structure7 of my business?
- 18. What taxes 8 will I need to pay?
- 19. What kind of insurance9 will I need?
- 20. Have I reached out to potential customers for feedback

Tips



- It is very important to validate your business ideas before you invest significant time, money and resources into it.
- The more questions you ask yourself, the more prepared you will be to handle to highs and lows of starting an enterprise.

Footnotes:

- 1. A mentor is a trusted and experienced person who is willing to coach and guide you.
- 2. A customer is someone who buys goods and/or services.
- 3. A competitor is a person or company that sells products and/or services similar to your products and/or services.
- 4. SWOT stands for Strengths, Weaknesses, Opportunities and Threats. To conduct a SWOT analysis of your company, you need to list down all the strengths and weaknesses of your company, the opportunities that are present for your company and the threats faced by your company.
- 5. A minimum viable product is a product that has the fewest possible features, that can be sold to customers, for the purpose of getting feedback from customers on the product.
- 6. A company is said to break even when the profits of the company are equal to the costs.
- 7. The legal structure could be a sole proprietorship, partnership or limited liability partnership.
- 8. There are two types of taxes direct taxes payable by a person or a company, or indirect taxes charged on goods and/or services.
- 9. There are two types of insurance life insurance and general insurance. Life insurance overs human life while general insurance covers assets like animals, goods, cars etc.

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