



कौशल भारत - कुशल भारत



सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP



N S D C
National Skill Development Corporation
Transforming the skill landscape



Skilling India in Electronics

Participant Handbook



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Sector
Electronics

Sub - Sector
Consumer Electronics & IT Hardware

Occupation
After sales service

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NSQF Level 4



Field Technician - Air Conditioner



Skilling India in Electronics

Address: 155, 2nd Floor, ESC House, Okhla Industrial Area,
Phase 3, New Delhi- 110020, India
Email: info@essc-india.org
Web: www.essc-india.org
Phone: +91 8447738501

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Email : info@essc-india.org

Website: www.essc-india.org

Phone: +91 11 46035050, +91 8447738501

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Shri Narendra Modi

Prime Minister of India

“

Skilling is building a better India.
If we have to move India towards
development then Skill Development
should be our mission.

”



Certificate

COMPLIANCE TO
QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARD

Is hereby issued by the

Electronics Sector Skills Council of India

for

Skilling Content : Field Technician Air Conditioner

Complying to National Occupational Standards of

Job Role/QP : **Field Technician Air Conditioner** QP No : **ELE/Q3101 Level 4**

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I would like to take the opportunity to thank everyone who contributed in developing this handbook for the QP Field Technician - Air Conditioner.

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

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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. The symbols used in this book are described below.

Symbols Used



Key Learning
Outcomes



Steps



Role Play



Tips



Notes



Unit
Objectives



Activity

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1. Engage with Customers for Service

Unit 1.1 – Understand Customer Requirements

Unit 1.2 – Interaction with Customers

Unit 1.3 – Suggest resolution to Problems

Unit 1.4 – Maintaining records for complaints and resolutions

Unit 1.5 – Achieving Productivity and Quality



Key Learning Outcomes



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

1. Understand customer requirements
2. Learn how to interact with customers
3. Suggest resolution to the problems of customers
4. Learn how to maintain records of customer's complaints and resolutions
5. Describe the importance of productivity and quality

UNIT 1.1: Understand Customers Requirements

Unit Objectives

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

1. Identify the customer requirements
2. Educate customer about different aspects of installing and repairing of equipment

1.1.1 Understand Customer Requirements

Understanding the needs of a customer is one of the foremost parts of a technician's job role. This includes the following practices:

- Call the customer as per the complaint registered to understand the issues
- Check time of visiting the location
- Greet the customer and talk politely
- Understand the customer's requirement
- Provide the best possible and cost effective solution to the customer
- Ensure that the customer is satisfied with the service
- Address the queries and issues raised by the customer about the equipment

1.1.2 Educating and Informing the Customer

Educating the customer about the products and their operation is an important aspect of field technician. For the satisfaction of customer, a field technician should inform the customer about the operational behaviour and other information of equipment installed by him at the customer site or premises.

The following figure shows list of information about equipment which is to be used by customer:

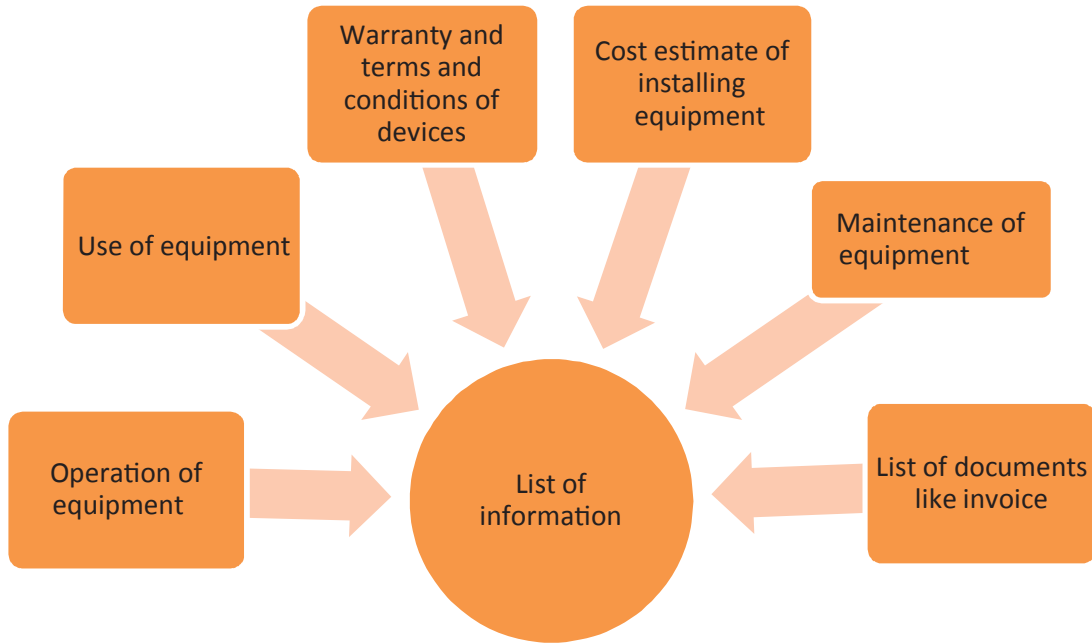


Fig 1.1.2: List of information about equipment

UNIT 1.2: Interacting with Customer

Unit Objectives

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

1. Analyse location requirements for equipment
2. Ask customers about their issues
3. Inform customers about repair procedure and warranty coverage of equipment
4. Educate customer about annual maintenance contract

1.2.1 Analyse Location Requirements

For a field technician, it is important to analyse the location before installing the equipment and other devices, for proper handling of and to prevent the equipment from any damage.

While analysing the location, understand the customer requirements such as where it should be installed and whether it can be installed at that location or should be taken to the service centre for any changes.

Some points that should be kept in mind while analysing the location requirements for equipment installation are as shown in the figure:

1.2.2 Asking Questions

Asking Questions is also a skill. Questions may be asked to get more details or to be sure of something. A field technician should ask customer queries to analyse the problems faced and seek inputs from them to understand the symptoms.

This figure enlists the points to be asked at customer's premises:

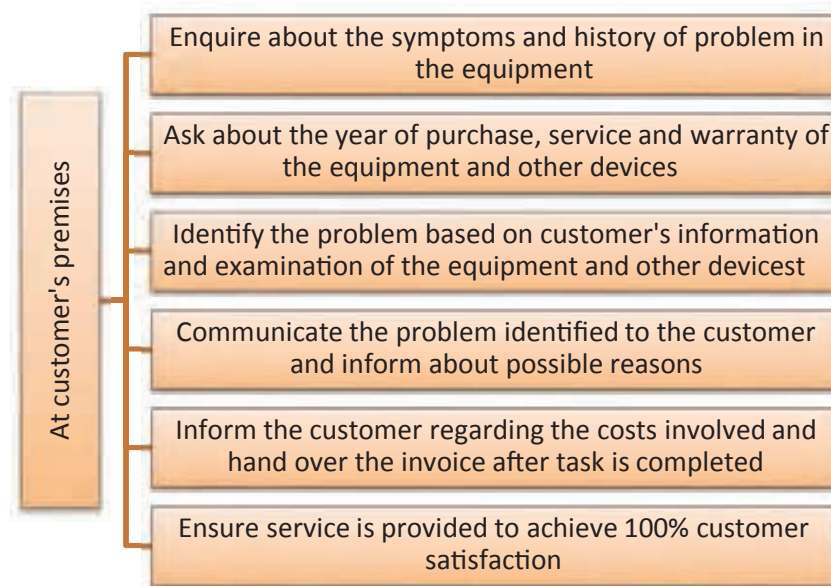


Fig 1.2.2: Points to be asked at customer's premises

Depending upon the intention of asking a question, it can be:

- Close ended questions – are mainly yes, no answer type questions. The purpose of asking such questions is to get specific details. The following table shows close ended questions:

Example	Question Tag
Did you come yesterday?	Do, Did, Is, Can, Could, Will, Would, Shall, Should and so on
Can you finish this task in 2 hours?	
Shall I do it now?	

- Open ended questions – are mainly questions which do not demand a specific answer but are probing for details. The following table shows pattern of open ended questions:

Example	
What do you think about the meeting yesterday?	
How was your day?	
Where have you been all afternoon?	

1.2.3 Warranty Coverage and Annual Maintenance Contract

A warranty coverage is an agreement between manufacturer and buyer which assure the customer to give free repair service till the mentioned date of warranty. A field technician should enquire about warranty coverage after inspecting the device which is to be replaced or repair.

If the device is out of warranty coverage, inform the customer about the initial charges of replacing the damaged part.

The following figure shows a warranty card template:

The image shows a warranty card template with the following fields:

- Name _____
- Address _____
- Zip code _____ State _____
- Email _____ Contact number _____
- Model number _____ Serial number _____
- (these can be found on the base of the machine)
- Date of purchase _____ Place of purchase _____

A barcode is located to the right of the Serial number field, and a red arrow points to it.

Fig 1.2.3.1: Warranty card template

Informing Customer about Replacement

In this, a technician is responsible to inform customer about the replacement or repairing procedure of equipment. Tell the customer about the estimated cost of repairing or whether the repairing will take place at service centre.

Annual Maintenance Contract

It is defined as a contract between two parties about maintenance of the product owned by other party on some terms and conditions which is negotiated in the starting and it is maintained in the form of legal contract.

A technician should educate customer about this contract and its benefits regarding product maintenance and legal terms and conditions, so that in future customer should be able to use this contract for repairing purpose of the damaged products.

This image shows template for annual maintenance contract of equipment

MAINTENANCE CONTRACT FOR AIR CONDITIONAR AND ACCESSORIES

Between _____ represented by
(hereinafter referred to as the COMPANY)
and _____ represented by
(hereinafter referred to as the CUSTOMER)

1. OBJECT

The CUSTOMER agrees to provide and the CONTRACTOR agrees to accept a Maintenance Service for the Equipment listed in appendix and serial number as the attached to page 1 subject to the following terms and conditions:

2. MAINTENANCE SERVICE

The CONTRACTOR shall provide all necessary labor, transport, replacement parts and test Equipment to maintain the Equipment in good working condition.

The CONTRACTOR's Maintenance Service shall include at

- 1. Routine Preventive Maintenance Service

The CONTRACTOR shall provide all necessary labor, transport, replacement parts and test Equipment to maintain the Equipment in good working condition.

- 2. Breakdown and Repairs to the EQUIPMENT

The CONTRACTOR shall provide all necessary labor, transport, replacement parts and test Equipment to maintain the Equipment in good working condition.

The CONTRACTOR shall provide all necessary labor, transport, replacement parts and test Equipment to maintain the Equipment in good working condition.

In the absence of appropriate response

In the absence of appropriate response

In the absence of appropriate response

Fig 1.2.3.2: Template for annual maintenance contract

UNIT 1.3: Suggest Solutions to Customer Problems

Unit Objectives

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

1. Provide solution to the customer problems
2. Explain customer about the estimated cost of repairing under warranty and time required to repair the faulty equipment
3. Inform customer whether the module require replacement with reasons

1.3.1 Suggest a Solution to the Customer

After identifying the issue, a field technician needs to offer solutions. The field technician should explain all the possible solutions along with the cost associated. The field technician should then propose the best solution and let the customer decide whether to go ahead with the given solution or not.

The following figure shows the steps involved in offering solutions to a customer:

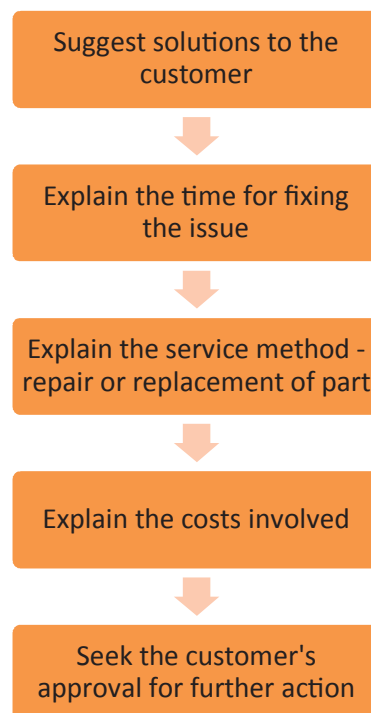


Fig 1.3.1: Suggesting a solution to the customer for an issue

1.3.2 Inform and Explain Customer about Modules Replacement

Under this topic, a technician required to inform customers on whether the module has to be replaced or repaired with reasons. For an instance, if the product is under warranty coverage then tell the customer about the estimated cost of repairing and time required to repair it.

The following figure shows the step required to inform the customer about modules replacement:

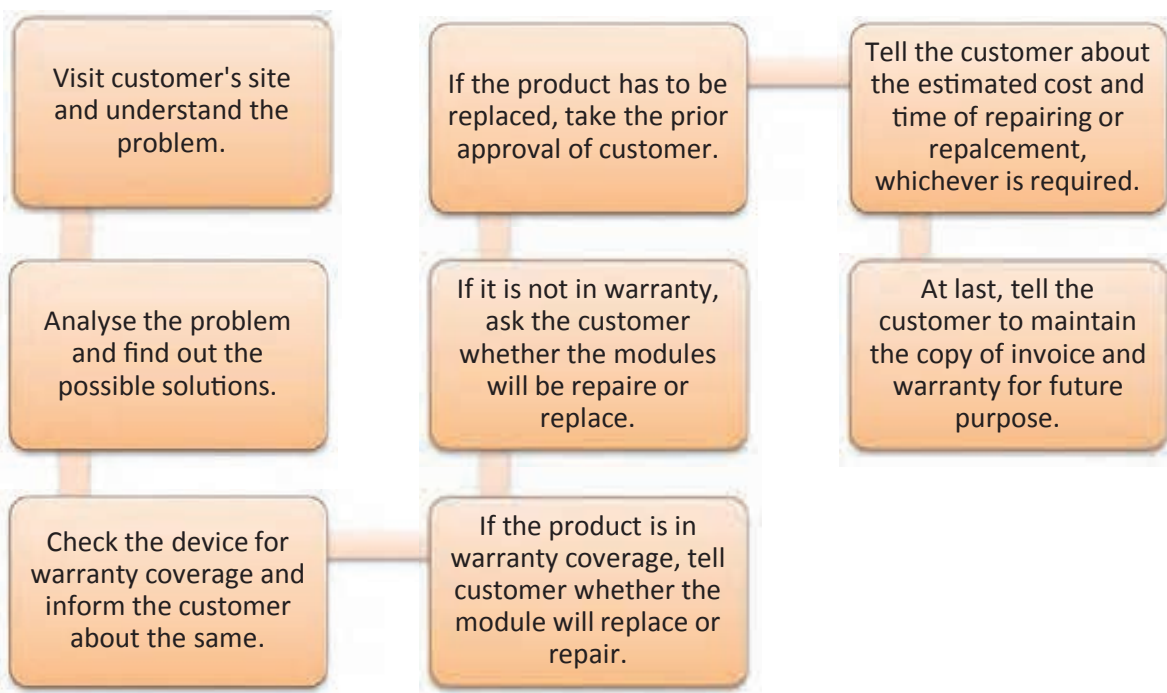


Fig 1.3.2: Steps required to inform the customer about modules replacement

UNIT 1.4: Maintaining Schedules and Records

Unit Objectives

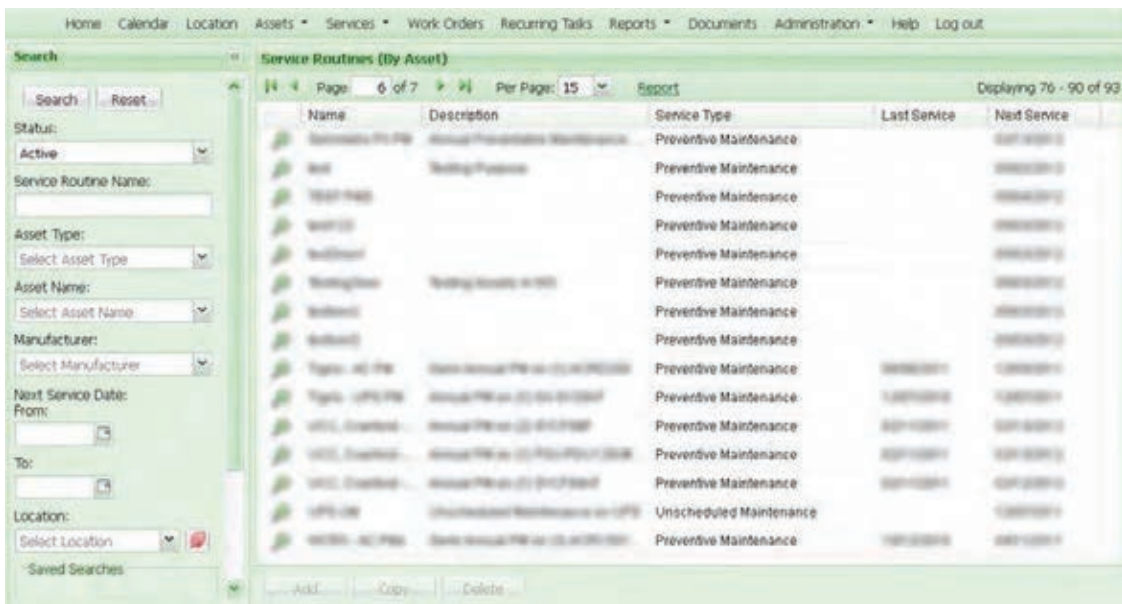
At the end of this unit, you will be able to:

1. Explain maintenance schedules
2. Tell customer to retain the copy of invoice and provide the same

1.4.1 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 timely equipment maintenance.

The following image shows a sample maintenance schedule report:



Name	Description	Service Type	Last Service	Next Service
Service Routine 1	Annual Preventive Maintenance	Preventive Maintenance	2023-01-01	2024-01-01
Service Routine 2	Filter Replacement	Preventive Maintenance	2023-02-01	2023-08-01
Service Routine 3	Coil Cleaning	Preventive Maintenance	2023-03-01	2023-09-01
Service Routine 4	Refrigerant Check	Preventive Maintenance	2023-04-01	2023-10-01
Service Routine 5	Condensate Drain Cleaning	Preventive Maintenance	2023-05-01	2023-11-01
Service Routine 6	Electrical Safety Check	Preventive Maintenance	2023-06-01	2023-12-01
Service Routine 7	Compressor Oil Change	Preventive Maintenance	2023-07-01	2024-01-01
Service Routine 8	System Performance Test	Preventive Maintenance	2023-08-01	2024-02-01
Service Routine 9	Emergency Repair	Unscheduled Maintenance	2023-09-01	2024-03-01
Service Routine 10	Annual Preventive Maintenance	Preventive Maintenance	2023-10-01	2024-04-01

Fig. 1.4.1.1: Sample maintenance schedule report

Equipment Maintenance

The field technician should assess the condition of equipment components and upgrade the if required. He/she should be aware of the compatibility issue. He 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 field technician 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:

The screenshot shows a software window titled "Enter Maintenance Requirements" with a teal background. The form is divided into several sections:

- Equipment Unit ID:** Contains two text input fields for "Internal Control No.:" and "Mfr. Serial No.:".
- Equipment Unit Description:** Contains several fields: "Name:" (dropdown), "Brand:" (text), "Model:" (text), "Capacity:" (text), "Classification:" (dropdown), and "Unit Location:" (text).
- Maintenance:** Contains fields for "Start Date:" (date picker, showing 10/24/2008), "Starting Usage:" (text, showing 0.00000000), "Maintenance Profile:" (dropdown), and "Description:" (text).
- Comments:** A large text area for entering notes.
- Warranty Date:** A date input field.
- Certified?:** A checkbox.
- Maximum Load:** A text input field.
- Customer:** A dropdown menu.
- Customize Captions:** A button.
- Table:** A table with three columns: "Type", "Elapsed Time Freq (Days)", and "Usage Frequency (Hrs)". It has several empty rows.
- Buttons:** A group of buttons including "Reproduce", "Print", "Delete", "Cancel", "Help", and "Ok".

Fig. 1.4.1.2: Sample maintenance requirement form

The technician should maintain a checklist for scheduling the maintenance.

1.4.2 Maintain the Copy of Invoice

Invoice is defined as a non-negotiable instrument given by the seller to the customer after purchasing of the goods and services. It acts as the bill of sale or contract of sale.

Invoice template consist of the following content:

- Trading parties (seller and customer)
- Quantity of items sold
- Date of shipment
- Mode of transport
- Rate and discount
- Delivery and payment terms

The field technician should provide a copy of invoice to the customer and tell him to retain a copy of it for future purpose.

The following image shows sample of invoice template:

The image shows a sample invoice template with the following sections:

- Company Information:** "Your Company Name or Logo" in a stylized font.
- Invoice Details:** "Invoice No:" and "Date:" fields.
- Address:** "Address:" followed by a blank line.
- To:** "To:" followed by a blank line.
- VAT Regd no:** "VAT Regd no:" followed by a blank line.
- Table:** A table with 4 columns: Qty., Description, Amount Exc. of VAT, and V.A.T. Net. The table has 10 empty rows.
- Summary:**
 - V.A.T. Rate: _____
 - Payment Terms: _____
 - Tax Point: _____
 - Sub Total exc. V.A.T. _____
 - V.A.T. _____
 - Total Due _____

Fig 1.4.2: Sample of invoice template

UNIT 1.5: Achieving Productivity and Quality

Unit Objectives

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

1. Deliver the service within service level agreement (SLA) time
2. Identify customer's requirement and put them at ease by providing appropriate solutions
3. Achieve customer's satisfaction
4. Maintain no repeat or second escalation from customer

1.5.1 Deliver Service within SLA time

To achieve customer's satisfaction, it is necessary to deliver the service within the time as mentioned in SLA. Managing the expectation of a customer is not easy for a field technician. 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 hardware 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. 1.5.1.1: 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.

The following figure enlist points required to achieve customer's satisfaction:

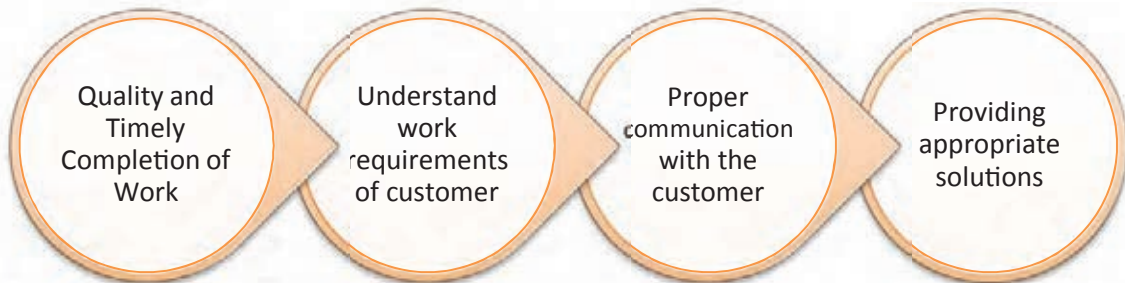


Fig. 1.5.1.2: Points required to achieve customer's satisfaction

Maintain Records of Activity

One of the most important parts of good customer service is maintaining accurate records, containing details of dealings with the customers. Customer records can help gather information about how best to market a company's services and also help to ensure that the organisation runs 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.

1.5.2 Maintain No Repeat or Second Escalation from Customer

Zero defect in work can be achieved in the following ways:

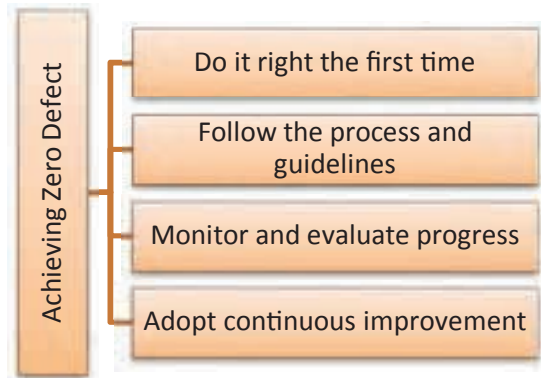


Fig. 1.5.2.1: Measures to achieve zero defect in work

Escalation Process

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 technician should do everything to resolve an issue in the first instance. To facilitate the fast and efficient resolution of the issues 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.1.5.2.2: 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 customer service decisions.

Step 2: Escalation to a supervisor or manager

If a helpdesk technician is not able to resolve a complaint, it can be escalated to a supervisor or manager. The manager will review the problem, respond to the complainant and attempt to resolve the issue to the customer's satisfaction.

In circumstances where the manager is unable to resolve the complaint to the customer's satisfaction, the complaint will be referred to the Solutions team.

Step 3: Referred to Solutions team

The Solutions team will review and try to resolve the issue to the customer's satisfaction in accordance with industry code and regulation.

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.





2. Basics of Electricity and Electronics

Unit 2.1 – Basics of Electric Circuits

Unit 2.2 – Components of Electric Circuits

Unit 2.3 – Inverter Technology

Unit 2.4 – Units of Measurement in RACW



Key Learning Outcomes



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

1. Describe electric circuits
2. Describe voltage, current and resistance
3. Define Ohm's law
4. Explain the difference between alternating current (AC) and direct current (DC)
5. Measure power and energy
6. Describe the active components
7. Describe the passive components
8. List electromagnetic components
9. List the basic functions of inverters
10. Identify the advantages of inverters
11. Explain the controller functions

UNIT 2.1: Basics of Electric Circuits

Unit Objectives

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

1. Describe electric circuits
2. Define voltage, current and resistance
3. Define Ohm's law
4. Explain the difference between alternating current (AC) and direct current (DC)
5. Measure power and energy



2.1.1 Electric Circuits

An electric circuit is a path made by the interconnection of electrical components. Electrons from a voltage or current source flow along this path. The following figure lists the elements present in a basic electric circuit:



A device in a circuit which consumes electric power is called load.

Example: Bulb



A source that provides electrical pressure known as voltage or EMF to electrical equipment to enable them to work.

Example: Battery



A conductor that connects the supply source and the load.

Example: Wires

Fig 2.1.1.1: Electric circuit constituents

An electric circuit consists of two paths/loops, as shown in the following image:



Closed Path



Open Path

Fig 2.1.1.2: Closed and open path

In a typical circuit, a battery provides voltage for the load through wires. For example, the required voltage for a bulb to glow is provided by a battery. The following image shows such an electric circuit:

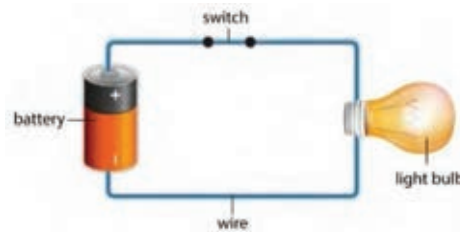


Fig 2.1.1.3: An electric circuit



2.1.2 Types of Electric Circuits

An electric circuit is classified into two types:

- Series circuit
- Parallel circuit

Series Circuit

In this type of a circuit, all components are connected as a chain and the current flowing through each one of them is the same all over the circuit. There is a single route through which the current flows. So, the current passes through each and every component. Opening or breaking any point in a series circuit causes the whole circuit to stop functioning which then needs to be replaced. The following image represents a series circuit:

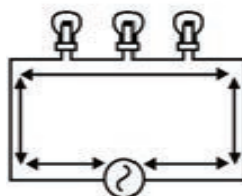


Fig 2.1.2.1: A series circuit

Parallel Circuit

In this type of a circuit, two or more components are connected in a parallel manner. In a parallel circuit, the components are of the same voltage. The current flow varies across the components. If any point of the circuit gets damaged, only that part needs to be replaced. The following image represents a parallel circuit:

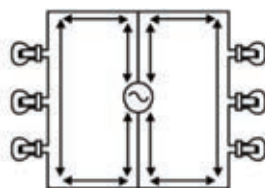


Fig 2.1.2.2: A parallel circuit



2.1.3 Parameters of Electric Circuit

Electricity is a natural force that comes into existence whenever there is a flow of electric charge between any two components. When working with circuits, awareness about some of the basic concepts of electricity is needed, otherwise a wrong connection in a circuit may cause high damage to the user and the circuit components. The main parameters associated with electricity are as follows:

- Voltage
- Current
- Resistance

Voltage

A force that causes electricity to move across the wire/cable is known as voltage. It can also be defined as the variance in the charge between the points of a circuit. Depending on the voltage, the electric current flows through a medium of a specific resistance. Volt is the unit of voltage and is denoted with letter V.

Current

Electric current, or simply current, is the flow of electric charge carried through electrons moving across wires. Ampere is the unit of current and denoted with letter I. The units of current are listed in the following table:

Unit	Denoted by
Micro-Ampere	(μ A) = 10^{-6} A
Millie-Ampere	(mA) = 10^{-3} A
Ampere	(A)

AC and DC Current

The following figure lists the two types of current sources that are dependent on the direction in which the electrons flow:

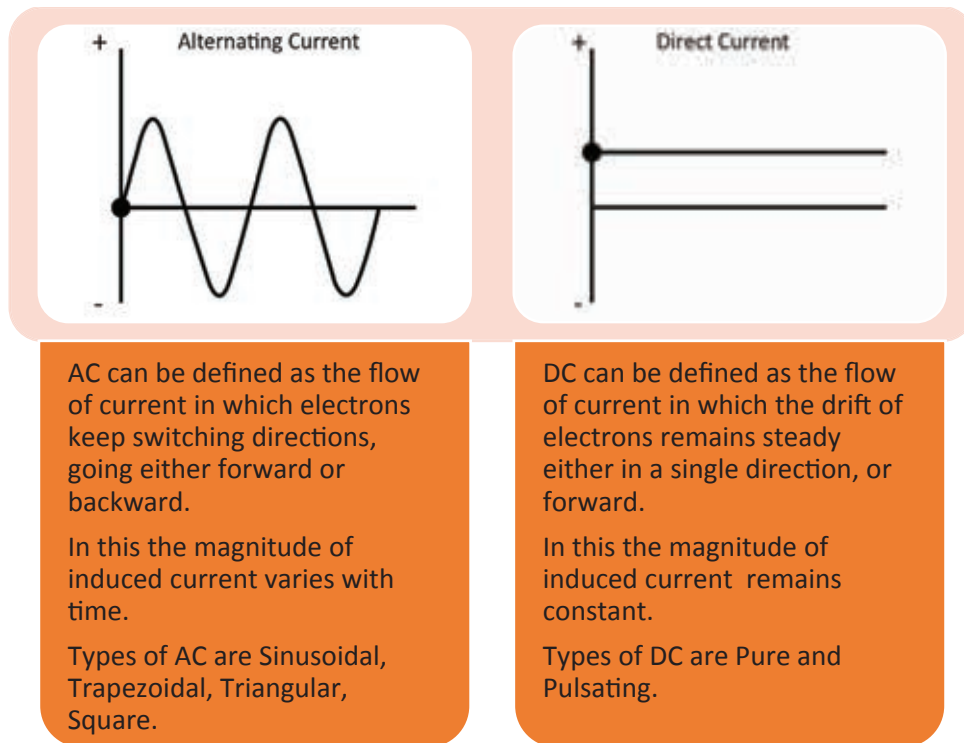


Fig 2.1.3: Difference between AC and DC current

Resistance

Resistance, as the word suggests causes hindrance to any occurring force. In other words, it is an obstruction caused by a substance to the current flow. The unit of resistance is ohm and it is denoted with the symbol, Ω . According to Ohm's law, 1Ω resistance allows $1A$ of current to flow from one point to the other with a $1V$ voltage difference.

2.1.4 Ohm's Law

According to Ohm's law, the flow of current through a conducting material is directly proportional to the conductor's voltage. The mathematical equation of Ohm's law is as follows:

$$I = V/R$$

where,

I is the current

V is the potential difference

R is the resistance



Ohm's law states that R in the preceding relation is constant and independent of the current flowing through it as shown in the following image:

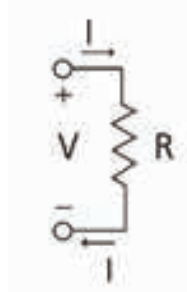


Fig 2.1.4: A simple electric circuit

2.1.5 Power Calculation and Energy Consumption

When electricity flows in an electric circuit, it results in some work done. For example, when it flows in a fan, the fan's blades rotate and when it flows in a refrigerator, it cools the things inside. Thus, when electricity flows through an appliance, it results in some work done. To calculate the electricity consumed, the following two parameters need to be considered:

- Power
- Energy

Power

The rate at which electrical energy flows through an electric circuit is known as electrical power. Similar to mechanical power, electric power is the rate of doing electrical work, measured in watts (one joule per second) and denoted by P . The term wattage often refers to electric power in watts.

Thus, to denote the electric power (in watts) given by an electric current I consisting of a charge of Q coulombs in every t seconds through an electric potential (voltage) difference of V , use the following equation:

$$P = \text{work done per unit time} = \frac{VQ}{t} = VI$$

Energy

If the electric power is the rate or speed of work done, then electric energy is the total amount of work done in a given time period. It is a product of the power of an electrical appliance and the duration of its usage. Electric energy can be explained with the following equation:

$$\text{Electrical Energy (E)} = \text{Power (P)} \times \text{Duration of Energy usage (T)} = \text{Power (Watt)} \times \text{Time (hour)}$$

$$E \text{ (Wh)} = P \text{ (W)} \times T \text{ (h)}$$

$$\text{Power} = \text{Energy} / \text{Time}$$

Example:

Electricity charges are paid based on "Units of Consumption"

$$1 \text{ unit} = 1 \text{ kWh}$$

If 500W is used for a device for 4 hours, then consumption is = $0.5 \text{ kW} * 4 \text{ Hrs.} = 2 \text{ kWh}$ (2 units). By multiplying the power consumption with rate of electricity, the electricity bill for the usage is determined.

UNIT 2.2: Components of an Electric Circuit

Unit Objectives

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

1. Describe the active and passive components
2. List electromagnetic components

A circuit consists of a number of components that may be electrical, electronic, mechanical and so on. The following figure represents various types of circuit elements or components that are used in a control panel:

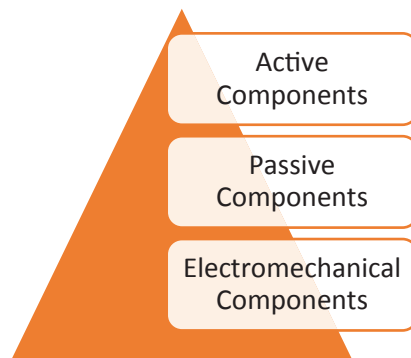


Fig. 2.2.1: Circuit elements



2.2.1 Active Components

Active components depend on a source of energy to perform their functions. These components can amplify current and can produce a power gain.

The following figure lists the different types of active components in a circuit:

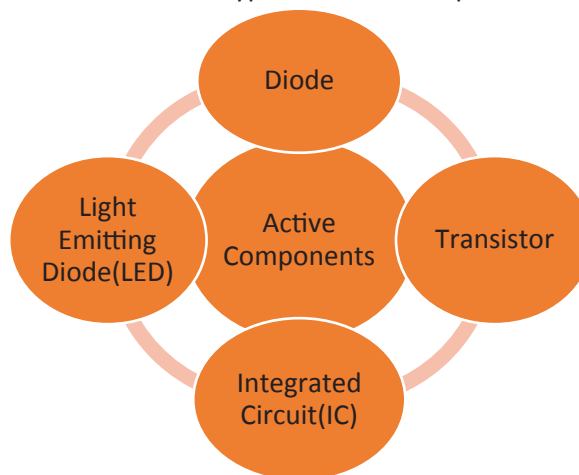


Fig. 2.2.1.1: Active components

Diode

A diode is a specialized electronic component with two terminals known as the anode and the cathode. It has asymmetric conductance, which means that it conducts mainly in one direction. It has very less resistance, ideally zero, to the flow of current in one direction whereas it has high resistance, ideally infinite, in the other direction. Diodes are usually made up of semiconductor materials such as germanium, silicon or selenium. Appliances such as refrigerators, air conditioners and washing machines have this component. The following image shows diodes:



Fig. 2.2.1.2: Diodes

Transistor

A transistor is an electronic device, made up of a semiconductor material. Usually, it consists of three or more terminals for connecting to an external circuit. It is utilized to amplify or switch electrical power and electronic signals. Appliances such as refrigerators, air conditioners and washing machines have this component.

The following image shows a transistor:



Fig. 2.2.1.3: A transistor

IC

An IC, also known as a microchip, is a semiconductor wafer on which a number of small resistors, capacitors and transistors are fabricated. It can work as an oscillator, an amplifier, a timer, a counter, a microprocessor or as computer memory. Appliances such as refrigerators, air conditioners and washing machines have this component. The following image shows an integrated circuit:



Fig. 2.2.1.4: An integrated Circuit (IC)

LED

An LED is made of a p-n junction diode which releases light when it is activated. It is a two-lead semiconductor source of light. Energy is released as photons when a suitable voltage is applied to the leads. Appliances such as refrigerators, air conditioners and washing machines have this component. The following image shows an LED:



Fig. 2.2.1.5: An LED



2.2.2 Passive Components

Passive components are those components which can perform their specific functions without any power source. These components are incapable of controlling current.

The following figure lists the different types of passive components in a circuit:

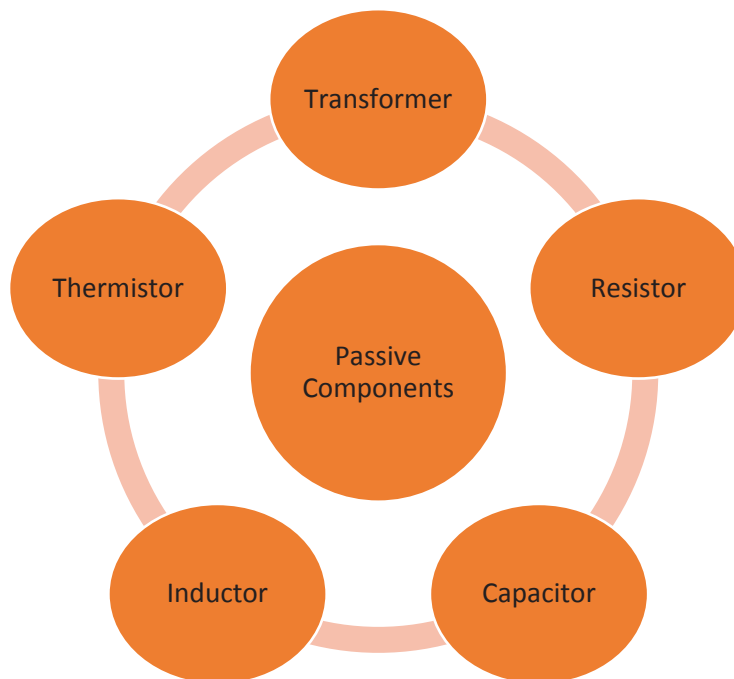


Fig. 2.2.2.1: Passive components

Transformer

A transformer consists of a metal core with coils of wire around it. It is a device used to convert alternating current (AC) to the required values by decreasing or increasing the alternating voltages in an electronic or electric system. Appliances such as refrigerators, air conditioners and washing machines have this component.

The following image shows a transformer:



Fig. 2.2.2.2: A transformer

Resistor

A resistor is a component in an electronic circuit which is built to resist or limit the flow of current in that circuit. It may be a small carbon device or big wire-wound power resistor. Its size varies in length from 5mm up to 300mm. Appliances such as refrigerators, air conditioners and washing machines have this component.

The following image shows resistors:

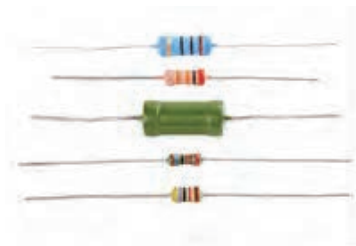


Fig. 2.2.2.3: Resistors

Capacitor

A capacitor is a device which is made up of one or more pairs of conductors and an insulator separating them. It is used to store electric charge. Appliances such as refrigerators, air conditioners and washing machines have this component. The following image shows capacitors:



Fig. 2.2.2.4: Capacitors

Inductor

An inductor consists of a coil or a wire loop. This component is used to store energy in the form of a magnetic field. The more the turns in the coil, the more will be the inductance. Appliances such as refrigerators, air conditioners and washing machines have this component.

The following image shows inductors:



Fig. 2.2.2.5: Inductor

Thermistor

A thermistor is a kind of resistor which is more sensitive to temperature as compared to other resistors. It is extensively used as an inrush current limiter, temperature sensor, self-regulating heating element and self-resetting overcurrent protector.

Appliances such as washing machines have this component. The following image shows a thermistor:



Fig. 2.2.2.6: A thermistor



2.2.3 Electromechanical Components

Electromechanical components convert electric energy into mechanical energy (mechanical movement) or vice versa for carrying out electric operations. The following figure lists various electromechanical components:

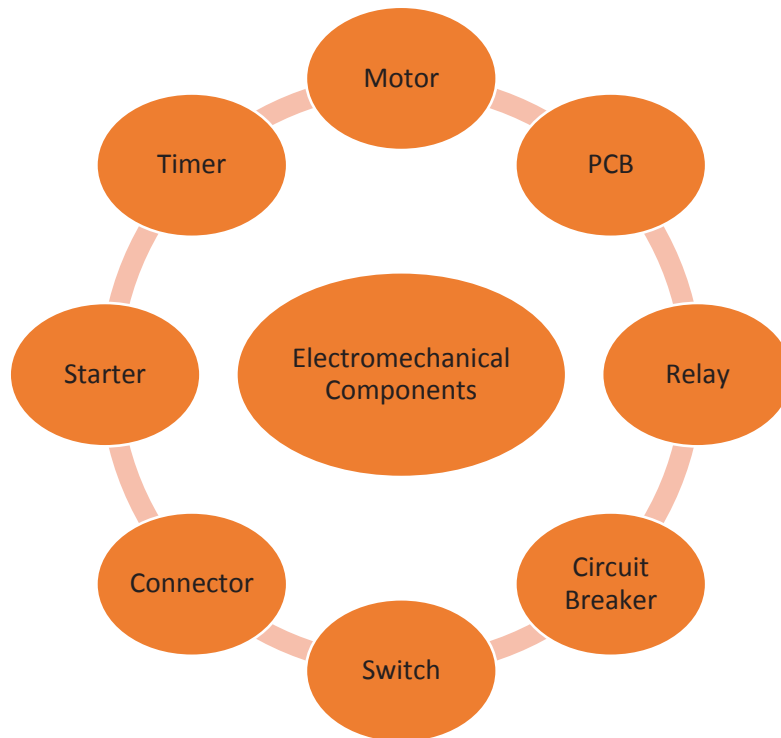


Fig. 2.2.3.1: Electromechanical components

Motor

A motor is an electrical component which is used to transform electrical energy into mechanical energy to produce linear or rotary force. Unlike magnetic solenoids, they generate usable mechanical powers.

In a normal motoring mode, force is generated inside the motor through the interaction between its winding currents and magnetic field. Appliances such as refrigerators, air conditioners and washing machines have this component. The following image shows the motor used in a mixer grinder:



Fig. 2.2.3.2: A mixer grinder motor

Types of motors are:

1. Capacitor start motor
2. Relay start motor

Capacitor Start Motor

In a capacitor start motor, the capacitor is connected in series with the starter winding, which causes current in starter winding. When the motor reaches 75% of the rated speed, the capacitor and the starter winding is disconnected by a switch.

A capacitor start motor is used in air conditioners and washing machines. The following image shows a circuit diagram of a capacitor start motor:

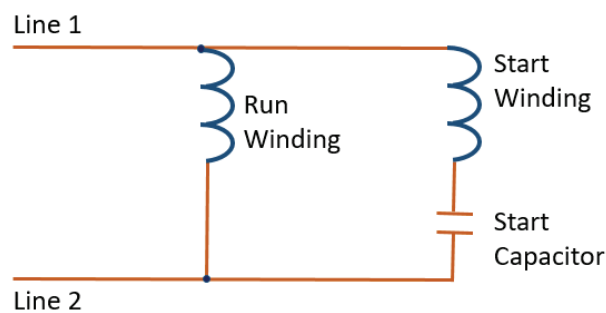


Fig. 2.2.3.4: Circuit diagram of capacitor start motor

Relay Start Motor

In a relay start motor a relay is connected between the starter and run winding, which causes current in starter winding. Then the resistance of motor increases with current, which cuts the start winding then the motor works only on run winding.

Relay start motor is used in refrigerators. The following image shows a circuit diagram of a relay start motor:

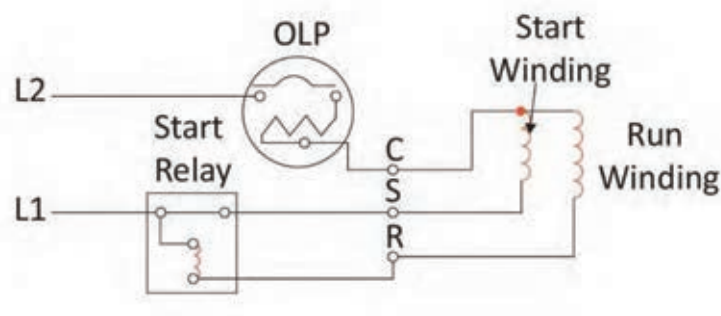


Fig. 2.2.3.5: Circuit diagram of relay start motor

Printed Circuit Board (PCB)

A PCB acts as a base for the components that are mounted on its surface and are interconnected with wires, conductive tracks and so on. The components are generally soldered on the circuit board according to the specified design. Appliances such as

refrigerators, air conditioners and washing machines have this component. The following image shows a PCB:



Fig. 2.2.3.6: A PCB

Connector

A connector is a device which is used to join two circuits together. The connector may be a port, a plug, a cable connector and so on. All appliances have this either in the form of a cable connector or a plug, as shown in the following image:



Fig. 2.2.3.7: Plug

Switch

A switch is a component used to make or break connections in an electrical circuit. A switch is used to divert the current from one conductor to another. It can be operated manually to control a circuit such as a light switch or can be operated by a moving object. It is made to control a wide range of currents and voltages.

The following image shows a typical switch used in small appliances such as refrigerators, air conditioners and washing machines:



Fig. 2.2.3.8: A rotary switch

Relay

A relay is a switch that controls an electrical circuit by opening and closing contacts in another circuit, electromechanically or electronically. In electromechanical relays, the opening and closing of contacts is done by a magnetic force. The electromechanical relays are operated by an electromagnet which is a coil of wire wrapped round an iron core. In solid state relays, the switching is electronic as there are no contacts. Appliances such as

refrigerators, air conditioners and washing machines have this component. The following image shows both the relays:



Fig. 2.2.3.9: Solid state relay and electromagnetic relay

Circuit Breaker

A circuit breaker is a requisite component of an electrical power system required for its control and protection. It is a switching device which can be operated manually as well as automatically. Its main function is to shield an electric circuit from harm caused by overload or short circuit. It interrupts the current flow when protective relays find out a fault. Appliances such as refrigerators, air conditioners and washing machines have this component. The following image shows a circuit breaker:



Fig. 2.2.3.10: A circuit breaker

Starter

A starter is a device that is used to start, stop, reverse and protect a motor. It controls the supply of electric power to the motor. It has two important parts, contactors and overload protection. Appliances such as air conditioners and washing machines have this component. The following image shows a starter:



Fig. 2.2.3.11: A starter

Timer

A timer, also known as a time switch, is a special type of clock that measures time intervals. It operates a switch that is controlled using a timing device. A timer may be built into a power circuit such as a water heater timer. It may also be built into the equipment such as a timer that turns on/off washing machine after a set period.

Even air conditioners have timers that turn it off after a set period. In case of refrigerators, there is a defrost timer that turns on after a set period of 15 to 30 minutes to melt the frost from the evaporator coil.

The following image shows some appliances that have a timer:



Fig. 2.2.3.12: A timer

UNIT 2.3: Inverter Technology

Unit Objectives

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

1. List the basic functions of inverters
2. Identify the advantages of inverters
3. Explain the controller functions



2.3.1 Inverter

The inverter technology is used to control the motor speed of the compressor. A DC inverter has an adjustable electrical inverter with variable frequency drive which helps control the speed of the electromotor. This drive converts the input AC current flow to DC and then the current is modulated to a desired frequency. This helps improve the efficiency of the appliances and the life of the compressor. It also reduces the noise produced by the appliances.

The following figure shows the basic workflow of an inverter in an AC:

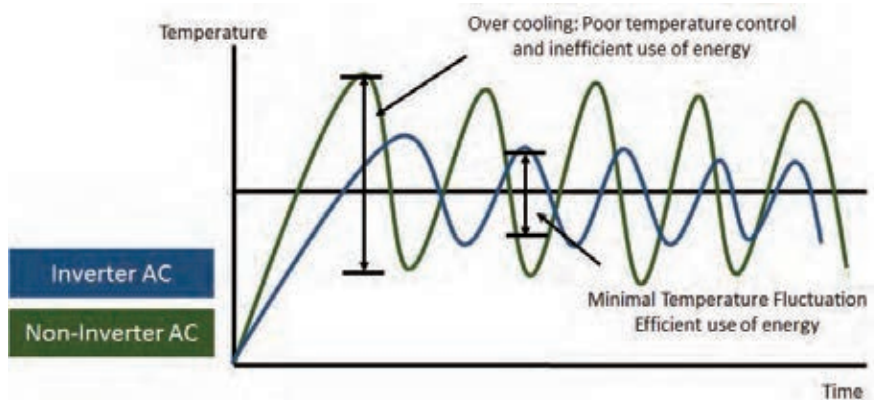


Fig. 2.3.1.1: Basic workflow of an inverter in an AC

The inverter's main functions are listed in the following figure:

Converting DC electricity into AC

Wave shaping of the produced AC electricity

Regulation of the value effectiveness of the produced voltage

Fig. 2.3.1.2: Basic functions of an inverter



2.3.2 Advantages of Inverters

The following table shows advantages of inverter based appliances over non-inverter based appliances:

Item	Non-Inverter	Inverter
Time to reach pre-set temperature	Relatively long due to fixed capacity	Short because of increased capacity
Fluctuations after reach pre-set temperature	Major fluctuations due to start/stop operations	Minor fluctuations due to load adaptable operations
Sudden current flow when the compressor started	5-6 times rated value	1.5 times rated value due to gradual increase at the start
Low temperature range during heating	Decrease in capacity	Decrease in capacity compensated by increased rotational speed
Defrosting time	Relatively long due to fixed capacity	Short due to maximum capacity operations
Unit composition	Relatively simple	Extra parts required
Trouble diagnosis	Relatively easy	Complicated

2.3.3 Controllers

Refrigerators, air conditioners and washing machines all require a control system to regulate the heating, cooling and air conditioning operations. A sensing device compares the actual state like the current temperature and pressure with the target state. Then it is the function of the control system to take action to start or stop the functioning of components like compressor, condenser etc. The following image shows an AC controller:



Fig. 2.3.3.1: An AC Controller

There are different types of controllers as shown in the given figure:

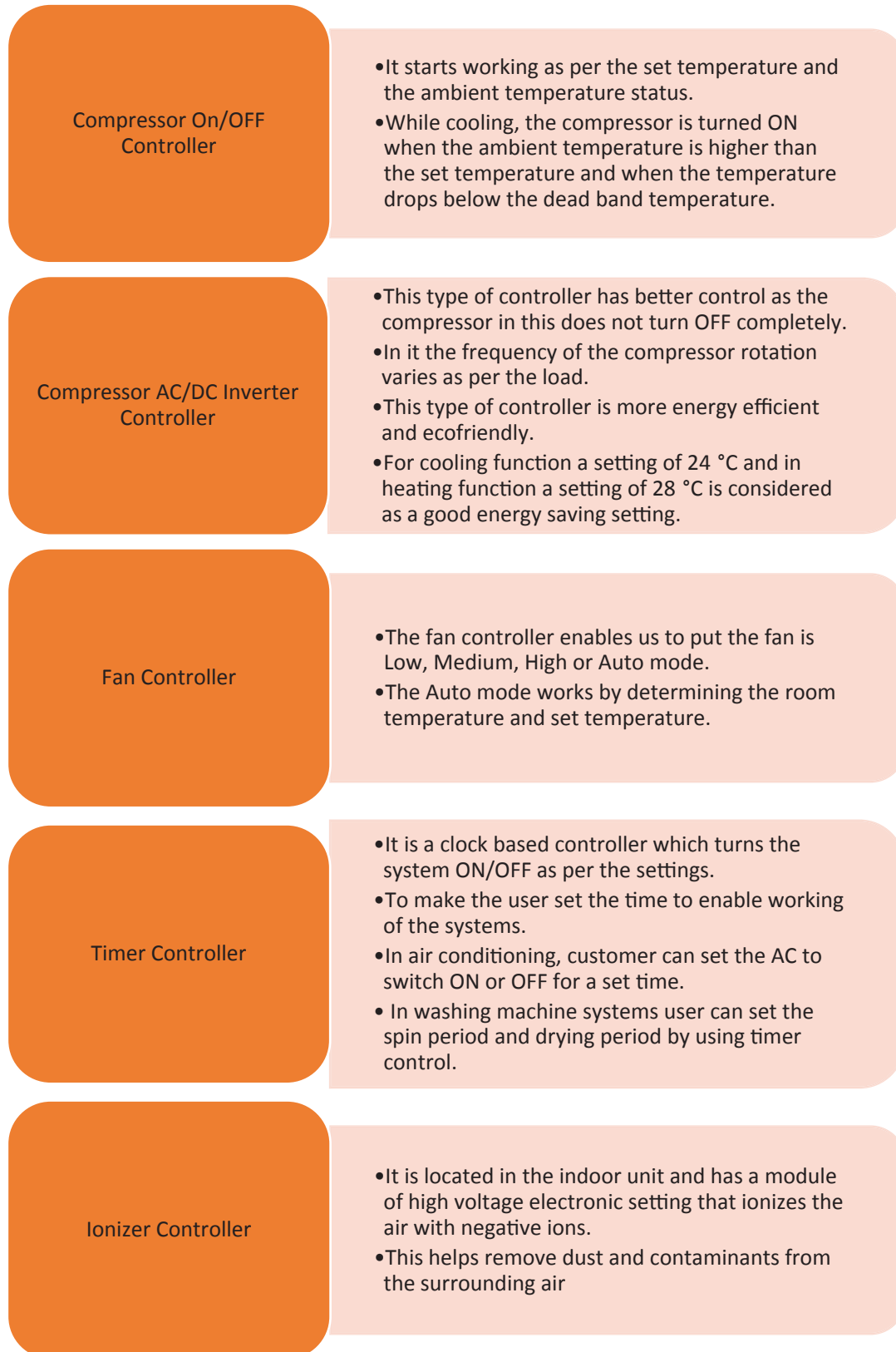


Fig 2.3.3.2: Type of controllers

2.3.4 Four Way Valves

A four way valve is an electro mechanical valve which is used to reverse the refrigerant flow of direction by using an electrical magnet. This is basically a heat pump reversing valve present in air conditioners and refrigerators. The heat pump is made up of four valves (A, B, C, D). The working of four way valves involves two modes – heating and cooling mode.

Cooling Mode

Tube A is connected to the compressor discharge port which is at high pressure. Tube B is connected to the return valve return port of the compressor which is at low pressure. Thus A has high pressure refrigerant and B has low pressure refrigerant.

The heat pump pushes the valve and allows the refrigerant at high pressure from tube A to tube D to outer coil, which drops the pressure of the metering device. Then the inner coil cools the area (inside of a house) and then comes back into tube C. The following image shows the working of a four way valve in cooling mode.



Fig. 2.3.4.1: A four way valve in cooling mode

Heating Mode

In the heating mode the refrigerant at high pressure goes from tube A to tube C which enables the refrigerant to flow in the inner coil to heat the inner area (inside of the house). This provides heat in the inner area. Then the pressure drops as the refrigerant goes through a metering device which lowers the pressure and it comes back into tube D.

Then the slider enables the refrigerant at low pressure to go from tube D to tube B and come back to the compressor to repeat the cycle. The following image shows a four way valve in the heating mode

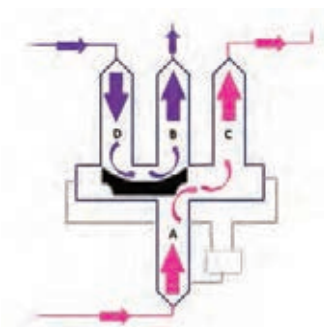


Fig. 2.3.4.2: A four way valve in heating mode

UNIT 2.4: Units of Measurement in RACW

Unit Objectives

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

1. Identify the standard units
2. List the conversion of BTU into other units
3. Explain efficiency and ratings of refrigeration and air conditioning

2.4.1 British thermal unit (BTU)

BTU or Btu (British thermal unit) is a traditional unit used in heat measurement. The BTU can be defined as the amount of heat which is required to raise the temperature of one pound of water by one degree Fahrenheit. In metric system this unit is Calorie which can be defined as the amount of heat required to raise the temperature of one gram of water by one degree Celsius.

Heat is considered equivalent to energy.

$$1 \text{ BTU} = 1055 \text{ joules}$$

Conversions

One BTU is approximately equal to all these units as shown in the following figure:



Fig. 2.4.1.: Conversion of BTU

2.4.2 Tons of Refrigeration and Rating

TR (Ton of refrigeration) is a unit of power which is used to explain the heat extraction of a refrigerator or an air conditioning system.

Ton of refrigeration can be defined as the rate of transfer of heat which causes the melting of one ton (907 kg) of pure ice which is at 0°C (32 °F) in a time period of 24 hours.

Refrigeration ton is equal to 12,000 BTU/hour or 3.5 kW.

The performance of refrigerators and air conditioners are specified by its capacity in BTU/h.

EER (Energy Efficiency Ratio)

The EER (Energy Efficiency Rating) is a score rating for the appliance used to measure their capacity and efficiency. It can be calculated by the ratio of cooling capacity to power consumption.

Higher EER means better efficiency

Calculated EER of 1TR

Cooling capacity = 3,514 W

Power consumption = 1,500 W

$EER = 3,514/1,500 = 2.34$

BEE standards

BEE (Bureau of Energy Efficiency) star rating system is based on EER. It is ranged from 0 to six. The higher the number of stars, better the efficiency of the appliance. This rating is mandatory as per the ACT to be followed by all the manufacturers. The following is the table which shows the EER ratings as per the BEE standards star rating band.

EER (W/W)		
Star Rating Min Max	Star Rating Min Max	Star Rating Min Max
1 Star *	2.70	2.89
2 Star **	2.90	3.09
3 Star ***	3.10	3.29
4 Star ****	3.30	3.49
5 Star *****	3.50	



3. Tools and Equipment Handling

Unit 3.1 – Identify the Use of Tools and Equipment

Unit 3.2 – Safety and Maintenance of Tools



Key Learning Outcomes



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

1. List the different types of tools used for installing appliances
2. Identify the correct methods of using tools
3. Maintain and handle tools properly
4. Identify the safety methods to be followed while handling tools

UNIT 3.1: Identify the Use of Tools and Equipment

Unit Objectives

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

1. Identify the types of tools used for installation
2. Identify the equipment used in installation of appliances

3.1.1 Introduction to Tools

Tools are non-consumable items that can be used in installing or servicing electronic appliances. Tightening of bolts, stripping wires and measuring angles and length can be easily done with the help of specific tools.

Hand tools are the tools which are operated easily to perform tasks by using power and grip of hand. Some examples of hand tools are screw driver, hammer, measuring tape, wrenches and so on.

Tools are essential for a field technician as it helps the technician to complete the task of installing appliances easily with less effort.

The following is an image of basic tools used in installation of appliances:



Fig. 3.1.1: Tools used in appliance installation

3.1.2 Basic Tools

The following tools are used for basic installation and servicing of appliances:

1. **Detachable small handle screwdriver:** A screw driver which can be used from either end. One end has a '+' shape for '+' shaped screws and other end for '-' shaped screws.
2. **Detachable long handle screw driver:** A similar kind of screw driver with long stem. This also can be used from either end. One end has a plus '+' shape for '+' shaped screws and other end for minus '-' shaped screws.
3. **Slim line slot head screw driver:** Used where we cannot reach with our hands or even fingers. It has a long and thin stem and has a minus '-' shape.

4. **Round screw driver:** Used to screw and un-screw the minus '-', plus '+', star '*', hexagonal or any other type of screws. It has a magnetic front socket which can hold bits of various shapes.
5. **Bit pad:** A pad with eight-ten bits of varied shapes to use with round screw driver.
6. **Extension bit/rod:** A component that is attached to the front of the round screw driver to increase its length. Once attached, it increases the reach of the screw driver by an inch to three-four inches. The following is an image of a screw driver set:



Fig. 3.1.2.1: A screw driver set with bits

7. **Tester:** It is used to check the presence of electric current in various sockets and wires during installation process. The following is an image of a tester:



Fig. 3.1.2.2: A tester

8. **Double ended round spanner:** A round spanner that can be used at either end. Each end has a different size. Generally, a set of spanner has a combination of sizes 10-11mm, 12-13 mm or 13-14mm.
9. **Simple spanner:** A normal spanner (wrench) which can be used at either end. These are also two in number. One is a combination of 10-11mm and other being a combination of 12-13mm and 14-15mm. The following is an image of spanner set:



Fig. 3.1.2.3: Spanner with wrench heads

10. **Adjustable wrench:** It is a spanner that can be adjusted as per the head size of a nut/bolt. It is helpful in situations where the installation engineer encounters a head which is either bigger or smaller than the limited sized spanner they otherwise carry along with them.

- 11. Measuring tape:** It is a self-retracting pocket tape measure which is used to measure wall thickness and other measurements while carrying out installation. The following is an image of a measuring tape:



Fig. 3.1.2.4: A measuring tape

- 12. Spirit level meter:** It is an ideal tool for precise determination of horizontals, inclines and angles of surface. The following is an image of a spirit level meter:



Fig. 3.1.2.5: A spirit level meter

- 13. Heavy duty hammer:** It is used for driving nails, fitting parts, and breaking objects. It has a handle and a head, with most of the weight in the head. One side of the head has a little slit that is used to pull out nails from walls or wooden brackets. The head of the hammer can be used as a reliable guide for minimum bend radius of coaxial cable while clipping it to the wall. The following is an image of a heavy duty hammer:



Fig. 3.1.2.6: A heavy duty hammer

- 14. Pliers:** Pliers are hand tools, designed primarily for gripping objects by using leverage. Three types of pliers are used by installation engineers:
- Combination pliers:** These are used for gripping small objects, to cut and bend wire and cable and to hammer other small tools such as a chisel or screwdriver and small nails. These pliers have a gripping joint at their snub nose, and cutting edge in their jaw. They also have insulated handle grips that reduce (but do not eliminate) the risk of electric shock from contact with live wires.
 - Side cutter or heavy duty cutter:** These are used to cut wires and nails.
 - Wire stripper/cutter:** Used for stripping wires, removing insulation on electrical wire while leaving the wire intact. It is an adjustable plier which can be adjusted using a screw driver to enable its usage on a thicker wire as well.

The following is an image of pliers and cutters:



Fig. 3.1.2.7: Cutters and pliers

- 15. Compression tool:** This is used to compress the connector on to the wire end. The connector is then connected to the LNBF of Antenna or to STB jack.
- 16. Cable preparation tool:** It is used to cut the cable and prepare it for use during installation. The following is an image of cable crimping tools:



Fig. 3.1.2.8: Cable crimping tools

Note: Compression and crimping tools are generally used together. Crimp tool is used to cut the wire and the compression tool is used to fix the connector to the end of a wire. Never try to cut the outer sheet of coaxial cable manually as it may cause problems later

- 17. Component box:** A small box to keep small spare parts like screws, nuts, bolts, p-clips etc.
- 18. Drill machine:** It is used to create holes and through-holes in concrete and masonry (max. diameter 20 mm). It is also used for drilling metal sheets, wood, drywall and driving screws. It operates at 600 W. It can be operated in two modes, normal as well as hammer. The normal motion is a rotatory motion whereas hammer motion is a combination of rotatory and hammer motion. There are separate bits for both the modes. The following is an image of a drill and drill bits:



Fig. 3.1.2.9: A drill machine and drill bits

- 19. Bits:** The way drill machine has two modes, normal and hammer. Bits are also of two types. One set of bit is used for normal drilling whereas the other for hammer drilling. Hammer drilling bit has got a different shape and has grooves for better grip. Hammer bit

is generally used for concrete and comes in varied sizes such as 6mm, 8mm, 10mm, 12mm and of 47mm length.

- 20. Digital multimeter:** It is an electronic device which is capable of taking various electronic measures such as current, voltage or resistance. The basic measurements that are normally made include voltage, current (both AC and DC) as well as resistance. Advanced multimeters have a variety of other functions such as measurement of frequency (not up to a high level of precision), capacitance and temperature. The following is an image of a multimeter:



Fig. 3.1.2.10: A digital multimeter

- 21. Torch:** A battery operated source of light. It is kept in the tool kit to use in case the light fades or is not appropriate during the time of installation.
- 22. Hacksaw:** It is used by the installer to cut a plastic pipe or a plastic conduit. It is a hand saw with a C shaped frame which holds a blade. The following is an image of hacksaw:



Fig. 3.1.2.11: A hacksaw

- 23. Cutting knife:** It is used at workplace to cut the tape of sealed package without damaging the packaging content. It is also known as a utility knife. The following is an image of cutting knife:



Fig. 3.1.2.12: A cutting knife

- 24. Keyhole saw:** It is used to cut holes in drywall or softer woods for new electric switch in the wall. It has a plastic or wood handle with a pointed blade. In some keyhole saw, various blades can be fitted in the same handle. The following figure shows a keyhole saw:



Fig. 3.1.2.13: A keyhole saw

- 25. Tube cutter:** This tool is used to cut a copper or a plastic pipe in a clean, convenient and faster manner. It is also known as a pipe cutter. The following image shows a tube cutter:



Fig. 3.1.2.14: A tube cutter

- 26. Torque wrench:** It is used to measure the torque in nuts or bolts. It is mainly used in prevention of over tightening of bolts and steam pipe and water pipe repairs underground. The following figure shows a torque wrench:



Fig. 3.1.2.15: A torque wrench

- 27. Wrench:** This tool is used to turn fasteners such as nuts and bolts by applying torque and tighten the screw. The following image shows a wrench:



Fig. 3.1.2.16: A wrench

28. Refrigerant gas detector: This tool is used to detect a gas leak around the appliance or in the surrounding. The following figure shows a gas detector:



Fig. 3.1.2.17: A gas detector

29. Digital clamp meter: An electrical tester which combines a multimeter with a current sensor is known as a clamp meter. The probes in the device measure voltage whereas the clamps measure the current. The clamps are the hinged jaws joined to an electric meter that allows users to clamp around the cable/wire anytime for measuring the current without disturbing any other element. While using a clamp meter, the wire/cable to be measured is not disconnected.

The following image shows clamp meter:



Fig. 3.1.2.18: A clamp Meter

UNIT 3.2: Safety and Maintenance of Tools

Unit Objectives

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

1. Safety measures to be taken while handling tools

3.2.1 Safety while Handling Tools

The tools selected for a particular set of job should be specifically suitable for the job. The tool should have a proper handle grip so as to avoid slipping of the tool while working. The tools should be used only for the purpose they are made for and not for any other purpose. The tools should be used under the safe working limits as per the design specification of the tool.

A technician should always wear personal protective wear such as safety gloves, safety helmet, safety goggles, safety shoes, ear protecting plugs and safety mask. The following are the images of personal protective equipment:



Fig. 3.2.1: Personal protective equipment (PPE)

The tools should be carried in proper toolbox in a managed and organised way. The tools should be kept at a secure place to avoid any unauthorised access and accident from the tools. Before working, check the work piece to prevent any damage to the tool to be used on the work piece.

While working at heights, tools should be tied or put in safe place to avoid any slipping and dropping of the tool. The tools should be operated in a correct position with proper strength for holding and operating the tool effectively. While using tools, correct procedure should be followed as per the manufacturer's instruction to operate the tool. While using sharp edged tools, ensure that the direction of movement of the tool should be away from the body. After the completion of work tools should be put in the appropriate place securely.

3.2.2 Maintenance and Housekeeping of Tools

As tools are essential for a service technician, regular maintenance and check needs to be done to maintain the tools in good condition. Using or working with a damaged, broken or unsuitable tool is hazardous.

To keep the tools in good conditions following steps should be checked:

- Get the tools from the store as per the requirement and return the tools in good condition after completion of work.
- A regular routine check of the tools should be done to examine the condition of the tools.
- Get the damaged and worn out tools fixed else get the tools replaced.
- Before and after completion of the work clean the tools properly.
- Edges of sharp edged tools should be maintained sharp.
- The tools should be kept in the store department in an ordered way in proper toolboxes.
- Sharp tools should be kept with protective guard over the sharp edges.
- Broken tools should be discarded with care.
- Regular examination, repair and maintenance of the tools should be carried out only by a competent person.
- Report about any issue related to damage or faulty tool/equipment to the store supervisor or senior.

3.2.3 Safety while Working

While working at a site, make sure you follow the safety regulations to avoid any accident. Safety is the primary concern as per the company's policy and standards.

Safety should be followed:

- While handling tools/equipment's
- Climbing an elevated surface or using ladders

The given safety points should be considered while working:

- Overloading – While using tools/equipment's make sure that they are not overloaded or operated beyond working limits. The ladder or structure over which you need to work should not be overloaded as well.
- Overreach – Do not try to reach beyond a point while working on a ladder or an elevated surface. Keep the safety line tied with the safety belt while working.
- Resting tools – Avoid resting or hanging of tools over an elevated surface.
- Carrying tools – Always carry tools safely or use tool belts for carrying tools.
- Stability – Always ensure to make a stable point of contact on the ground and especially on an elevated surface like a roof or a ladder. Ensure making three points of contact rule for stable position before starting the work.
- Standardised equipment – Make sure you are using standardised equipment like tools, ladders and safety equipment.

- Maintenance – Always maintain your tools and equipment in good condition and clean them before using.

First Aid

While working at the site and handling tools and equipment a person might suffer some injury. So, to handle such a situation the technician should carry a first aid kit which can help provide the first aid necessary. The first aid box may contain:

- Instructions to provide first aid.
- Sterile and antiseptic liquids.
- Bandages of appropriate sizes and cotton.
- Scissors, clippers and tweezers.
- Cold pads.
- Disposable gloves.

The technician should also have a basic knowledge to provide first aid. Also in case of any accident, contact emergency services as soon as possible via communication methods.



4. Air Conditioners

Unit 4.1 – Basic Concepts of Air Conditioners (ACs)

Unit 4.2 – Working and Installation of Window ACs

Unit 4.3 – Servicing Window ACs

Unit 4.4 – Installing Split ACs

Unit 4.5 – Servicing Split ACs

Unit 4.6 – Environmental Impact of Air Conditioning



Key Learning Outcomes



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

1. Define the factors, comfort zone and heat load of ACs
2. Identify the different parts and working of Window ACs
3. Follow safety precautions for installation of Window ACs
4. Test-run a Window AC
5. Describe wiring diagrams for Window ACs
6. Test electronic components of Window ACs
7. Service and repair Window ACs
8. Identify the different parts and working of Split ACs
9. Follow safety precautions for installation of Split ACs
10. Test-run a Split AC
11. Describe wiring diagrams for Split ACs
12. Test electronic components of Split ACs

UNIT 4.1: Basic Concepts of Air Conditioners (ACs)

Unit Objectives

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

1. Define the factors for air conditioning
2. Define heat load and comfort zone of ACs
3. Describe the types of ACs

The main objective of having a confined space air conditioned is to make it comfortable for its occupants. This means making the indoors cooler or warmer irrespective of the heat or cold outside. The basic principle at which AC works is similar to a refrigerator, except the AC does not confine the coolness inside its unit but spreads it outside the unit into the room using a fan. The refrigeration cycle of ACs is also similar to that of refrigerators using the same principles and components.

4.1.1 Factors for Air Conditioning

Air conditioning typically means modifying (cooling or heating) the air inside a closed environment. This modification is affected by four factors, as shown in the following diagram:

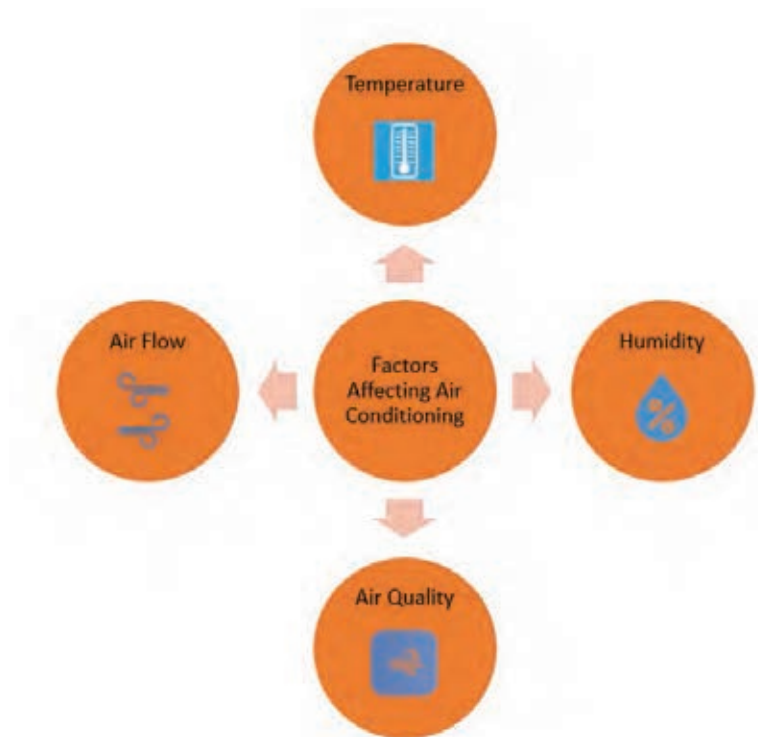


Fig. 4.1.1: Factors affecting air conditioning

The preceding factors decide the working of the ACs as well as how effective the ACs would be in that closed environment.

For example, typically, ACs should lower the temperature in summers and increase the temperature in winters for a closed room or space. The decrease in temperature is done by removing the humidity and heat that is generated by the environment and living beings (such as humans and their pets) existing in that environment. ACs should also work to improve the air quality, by removing odour and dust particles suspended in the air due to heat. Lastly, ACs need to ensure that there is proper air movement and circulation to avoid any suffocation due to air modification.

4.1.2 Heat Loads and Comfort Zones

Any physical activity, running home or commercial appliances, lighting, sun light/rays, open windows and other factors, which contribute to heat generation in a confined space or room is called heat load, as shown in the following image:

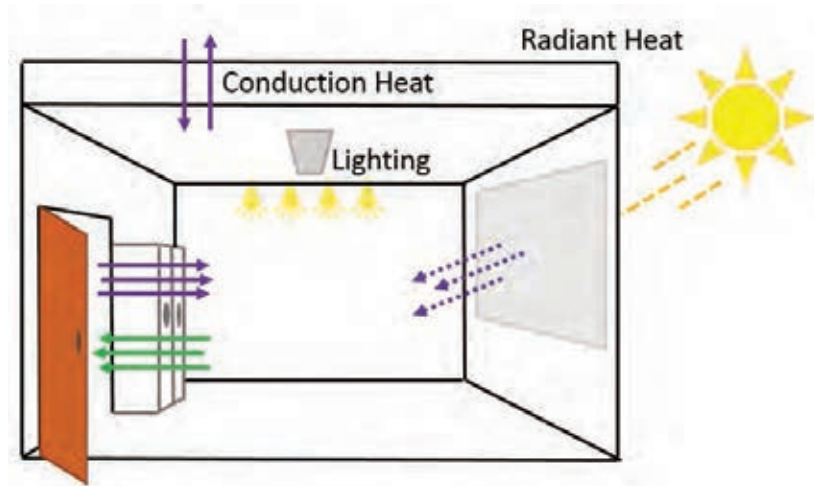


Fig. 4.1.2.1: Heat loads

Typically, the following factors in a home or office environment contribute to the heat load:

- Area of the space
- Running appliances (such as computers)
- Entry area for sun rays/light, such as windows, ceilings and so on
- People
- Activity/movement in the room, such as moving furniture, frequent opening of the door/windows and so on
- Artificial light used to illuminate the room

The capacity of ACs needed to cool the room/space, depends on the preceding factors. Higher is the number and intensity of these factors, more is the capacity of the AC needed to cool the room.

The capacity of ACs is measured in terms of ton, which means the amount of heat that an air conditioner can remove from a confined space within an hour.

Comfort zone is achieved when the internal conditions, air and environment, of a room or closed space is controlled to maintain a comfortable temperature for the occupants irrespective of the outdoor weather or temperature, as shown in the following image:



Fig. 4.1.2.2: Comfort zone

4.1.3 Types of ACs

There are primarily two types of ACs used in a home and office environment:

- Window ACs, as shown in the following image:

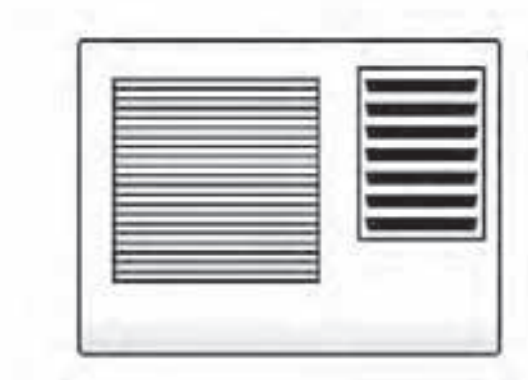


Fig. 4.1.3.1: Window AC

- Split ACs, as shown in the following image:



Fig. 4.1.3.2: Split AC

The working of the ACs, window or split used in homes or offices, is shown in the following diagram:

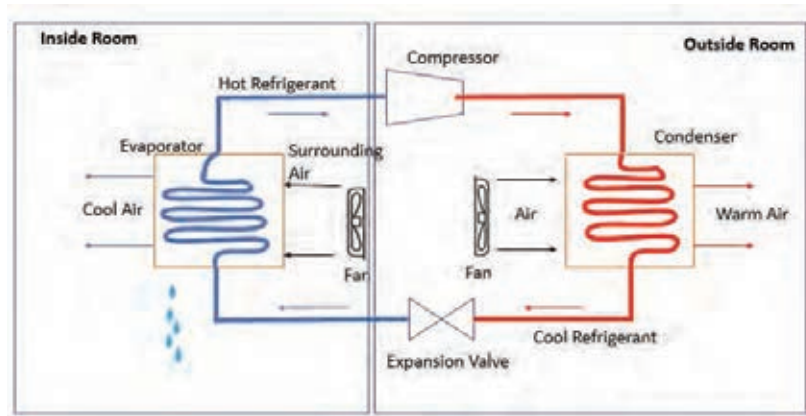


Fig. 4.1.3.3: Working of AC

The ACs shown in the preceding images work on a principle of reverse cycle or heat pumps. They work by taking the heat from the air outside and transferring it into a closed space. These ACs use a refrigerant to cool the air that is being transferred inside. An additional feature that these ACs may have is to filter the air inside.

Every AC contains a compressor inside its unit that is used for compressing and pumping the refrigerant gas. The following figure shows the steps of a refrigeration cycle:

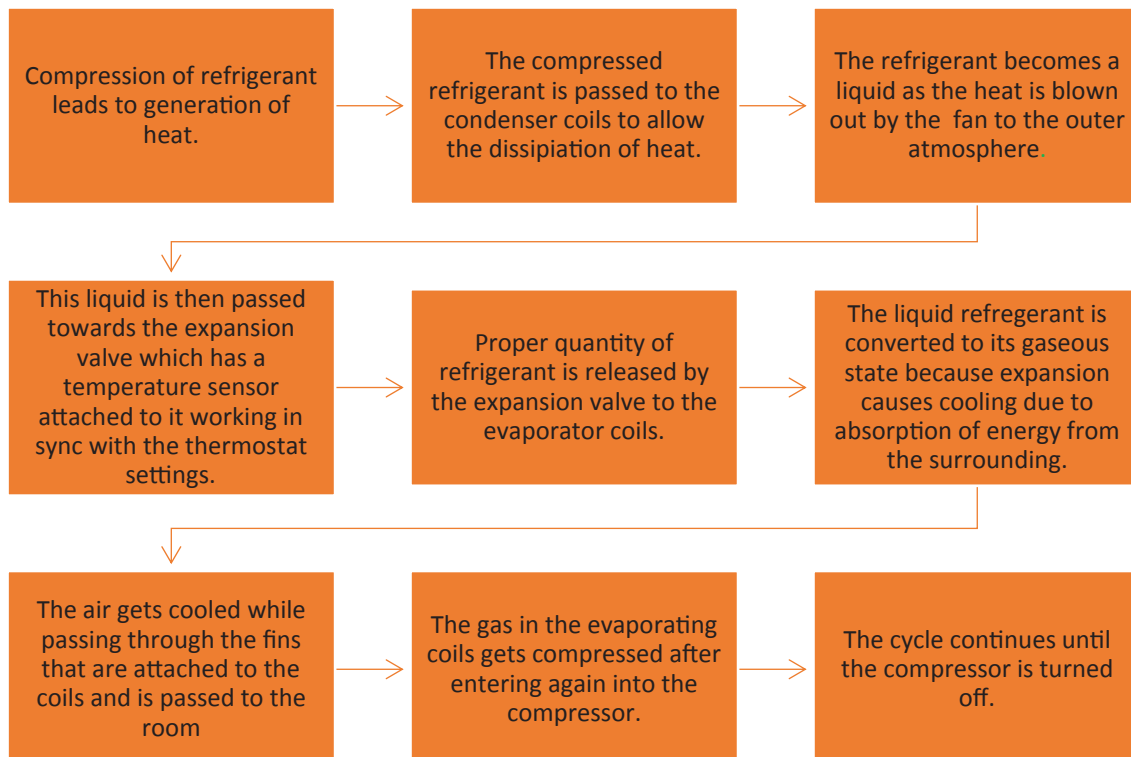


Fig. 4.1.3.4: Steps of refrigeration cycle

Heat is drawn by the air conditioner from the indoor and is released to the outdoor. The indoor plays as a source and the outdoor acts as a heat sink.

UNIT 4.2: Working and Installation of Window ACs

Unit Objectives

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

1. Identify the different parts and working of Window ACs
2. Follow safety precautions for installation of Window ACs
3. Test-run a Window AC

4.2.1 Working of a Window AC

Window ACs are the most common type of ACs used in homes and small offices. These are also the cheapest type of ACs.

Window ACs require a window or a hole in the wall, the size of the AC unit, and one part of the unit is inside the window/wall and the part is outside in the open, preferably with lots of space available.

Window ACs consist of two main units:

- Inside unit, which cools the room/space, consists of:
 - Return air grill
 - Air filter
 - Control panel
 - Thermostat sensor
 - Adjustable louvers
 - Evaporator coil
- Outside unit, which absorbs the heat in the room and transfers outside the room, consists of:
 - Blower motor
 - Partition
 - Fan
 - Compressor
 - Condenser coil
 - Drain tray/pipe

The assembly of a window AC is shown in the following figure:

A solid base on which all the parts are assembled.

A casing on which the base is installed. The casing is fixed on the wall or in the window.

An insulated partition which segregates the inside unit from the outside unit.

A front panel which has horizontal and vertical louvers, which can be adjusted as per the desired direction of air flow.

A control panel which has various controls to manage temperature, fan speed, etc. for the AC.

A refrigeration system comprising of condenser, compressor, expansion valve and evaporator. This system uses the same refrigeration cycle as that of a refrigerator.

An air circulation system, contains:

- Blower which absorbs the inside air and filters it. The air then passes through the cooling coil to get chilled and then blow into the room again.
- Condenser fan
- Fan motor

A drainage system allows removing of dew drops accumulate in the bottom base unit.

- The AC unit is installed with a slight tilt angle towards outside for the collection of dew when the room air gets chilled.
- There is a small opening at the back connected to the small drain pan and the piping for the drainage of water.

An electrical protection system contains a thermostat that senses the coil temperature.

- It protects the motor connected to compressor against getting overheated.
- It prevents burning of winding coil due to overheating while the air conditioner is running for long time by tripping the compressor and stopping it until it cools down.

Fig. 4.2.1.1: Assembly of a window AC

The parts of window ACs is the same as explained in the preceding units and is shown in the following image:

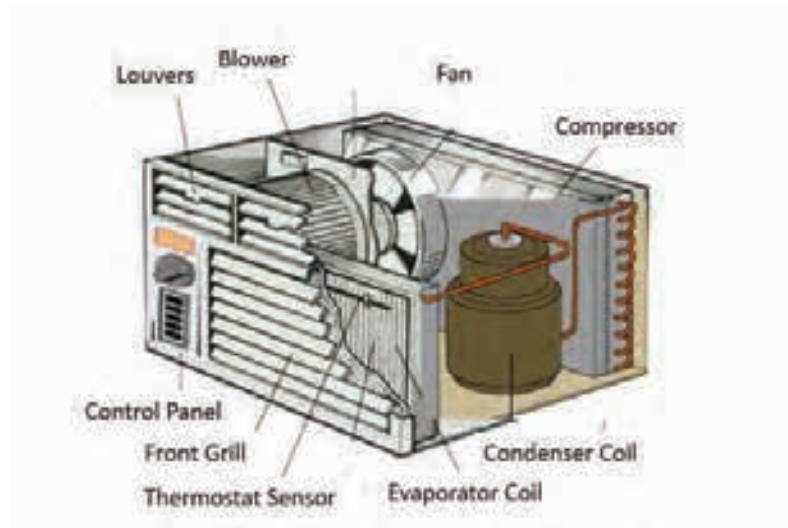


Fig. 4.2.1.2: Parts of a window AC

4.2.2 Installation and Safety Precautions

Prerequisites for Installation

Before going for installation of a window AC at a customer site, ensure that the instructions shown in the following figure are performed:

- 1. Carry all tools and personal protective gear required, neatly organized
- 2. Check that all tools and equipment, such as a drill, is working properly
- 3. Ensure all the units have been delivered before visiting the site
- 4. Check the packing to see if it is proper and has not been tampered or damaged
- 5. Carefully unpack the unit and its parts, such as remote, grill, filter, and so on
- 6. Wear insulated shoes for installation
- 7. Ensure there is a step ladder available if installation is to be installed at a height

Fig. 4.2.2.1: Prerequisites for installation

In case drilling or gas refilling needs to be done in the wall, then follow the precautions shown in the following figure:

Drilling	Ensure there is no loose wiring and plug has been properly insulated.
	Use proper drill bits and key to loosen/tighten the bits.
	Keep steady hands while drilling and wear goggles to protect eyes from debris and dust.
Gas Refilling	Discharge the refrigerant in open space.
	Use gloves while handling the refrigerant.
	Check the cylinder to ensure that it is sealed properly as per standards.
	Hold and store cylinder in upright position.
	Keep cylinders away from heat.

Fig. 4.2.2.2: Precautions taken at during installation

Installation

Before installation, ensure you have carefully examined the site for installation and checked all conditions for installations, such as proper availability of space for indoor and outdoor unit, proper electrical points available, proper window/hole in wall available, and so on.

The installation of a window AC looks similar to the one shown in the following diagram and the specified dimensions should be maintained while installing:

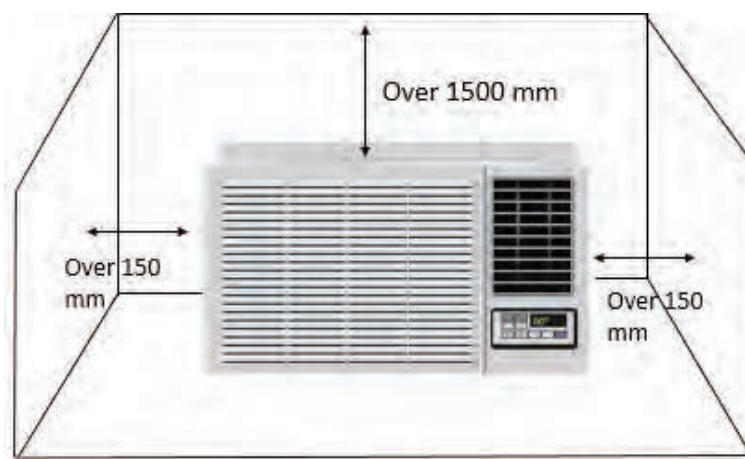


Fig. 4.2.2.3: Specification of dimensions of the AC unit

To install a window AC, perform the following steps:

1. Remove the AC carefully from its packaging.
2. Remove the glass/grill from the window where the AC needs to be installed.

3. Ensure that the hole/window is as per the dimensions required by the AC. If the hole/window is bigger, then apply proper wooden panelling or insulation around it to make it fit for the AC's size.
4. Analyze the frame of the hole/window to ensure that it has enough strength for holding the weight of the AC unit.
5. Fix the outer casing of the AC to the frame of the window. Ensure that it is firm and properly fixed. The casing need to be fixed strongly so that it can take the whole weight of the AC.

In case the hole is in a wall, then the casing needs to be fitted into the wall by drilling strong holes in the wall and securing the casing with strong screws.

Also, ensure that the casing is titled at a small angle (2-3 degrees) on the outside (back of the AC). This would ensure that the dew collected from the cooling coil is drained outside from the drain tray and pipe.

6. Using a colleagues help, pick up the main AC unit and slide it in the casing carefully. Ensure the unit is sitting firmly in the casing and secure it properly using screws.
7. Connect the electrical wires to the control panel.
8. Place the front panel grill and filters.
9. Connect the power supply to the AC's cord. Check if the AC is working.

4.2.3 Test-run a Window AC

After instalation of the AC, it is important to check if the AC is functioning properly and if it's controls (such as the remote) is also working properly. Moreover, you should also explain the basic funtions of the AC to the customer after installation.

To test-run the AC, perform the following steps:

1. Ensure all electrical wiring has been done and the main power cord of the AC has been plugged in to the power point, as shown in the following image:

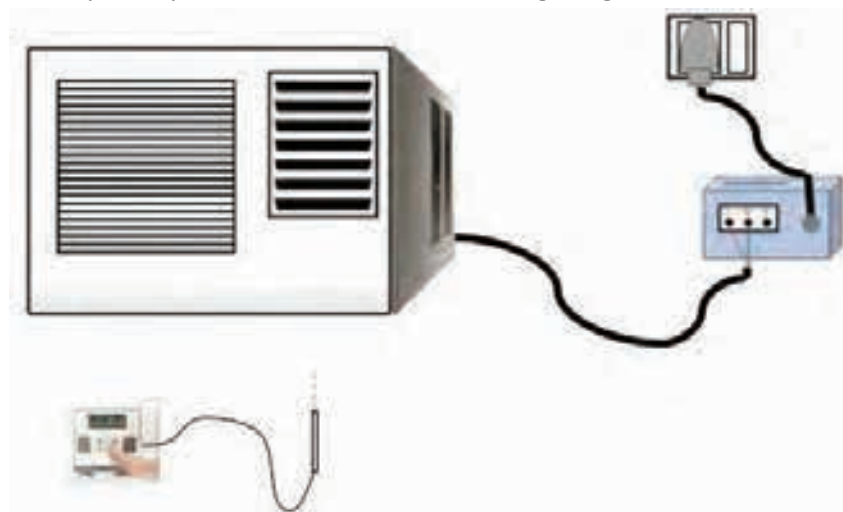


Fig. 4.2.3.1: Electrical wiring of AC unit

2. Ensure that all front grills and filters have been properly placed.

- Switch on the AC and set the temperature at 18°C as shown in the following figure:



Fig. 4.2.3.2: Setting temperature

- Let the AC run for 15-20 minutes.
- Check the functioning of the front control panel.



Fig. 4.2.3.3: Checking the functioning of front control panel

- Check the functioning of the remote control and all its buttons.



Fig. 4.2.3.4: Checking the functioning of remote

- Check the cooling effect in the room after 15-20 minutes.
- Check the following temperatures:
 - Outdoor unit should be approx. 42°C
 - Grill should be approx. 9°C

UNIT 4.3: Servicing Window ACs

Unit Objectives

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

1. Describe wiring diagrams for window ACs
2. Test electronic components of window ACs
3. Service and repair window ACs

4.3.1 Wiring Diagrams for Window ACs

A field technician is required to service and repair the window ACs as per customer requests and complaints.

To be able to carefully service and repair an AC, the field technician should be able to read and understand the wiring diagrams of the ACs and understand the electric circuits and connections properly.

A simplest wiring diagram of a window AC is shown in the following figure:



Fig. 4.3.1.1: Wiring diagram of a window AC

The following figure shows a wiring diagram of the inside unit of an AC:

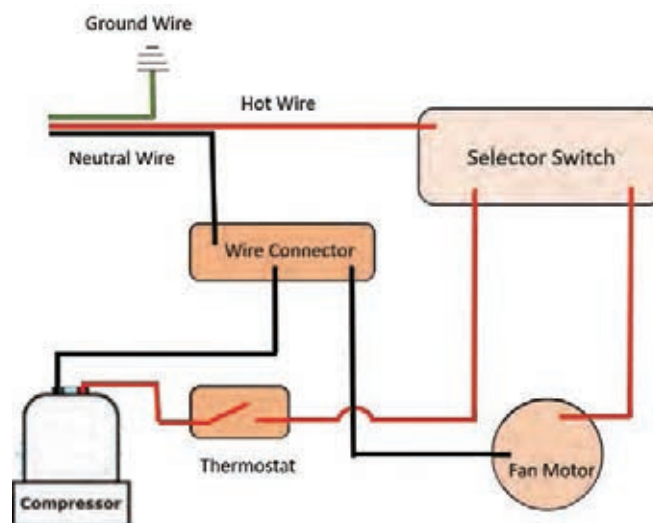


Fig. 4.3.1.2: Wiring diagram of the inside unit of a window AC

The power cable is split into three wires inside the unit as described in the following figure:

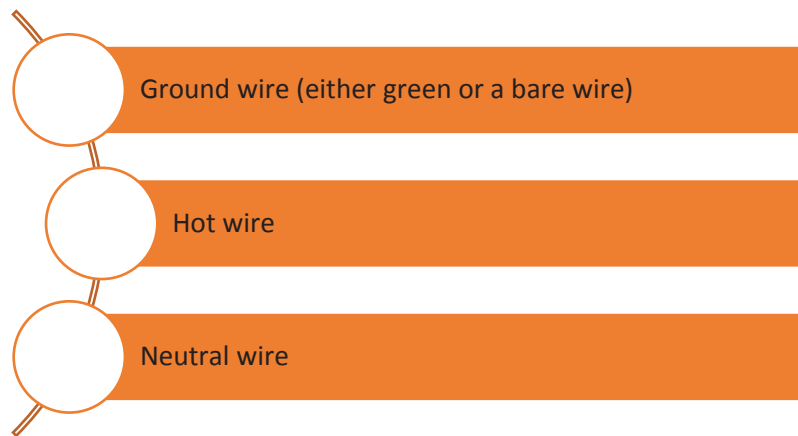


Fig. 4.3.1.3: Wires of a power cord

The ground wire is connected to the metal case of the unit.

The hot wire that feeds power to the important parts of the window unit, along with the compressor and the fan motor, connects the selector switch to the other parts, as follows:

- Hot wire → Selector switch → Thermostat switch → Compressor
- Hot wire → Selector switch → Fan motor

Neutral wire is directly connected to fan motor as well as the compressor through the wire connector that is placed at the back of the selector switch in order to keep all neutral wires common to each other as being connected to the same point.

The following figure shows another wiring diagram of an AC window with overload protection:

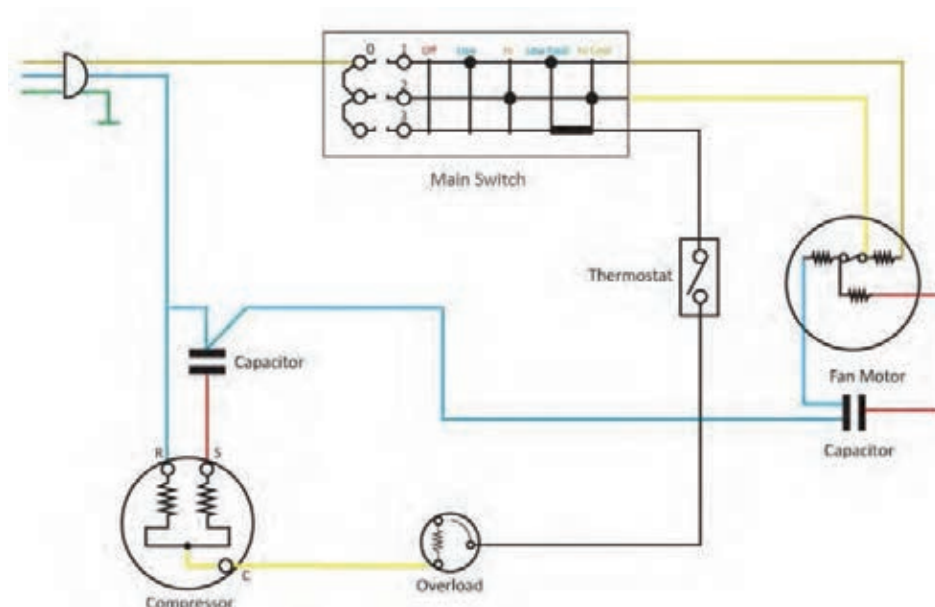


Fig. 4.3.1.4: Wiring diagram of an AC window with overload protection

4.3.2 Testing Electronic Components

A field technician should start with testing the various modes of operation to check which components of the window AC are operating fine or not. The following figure shows the steps of checking various components:

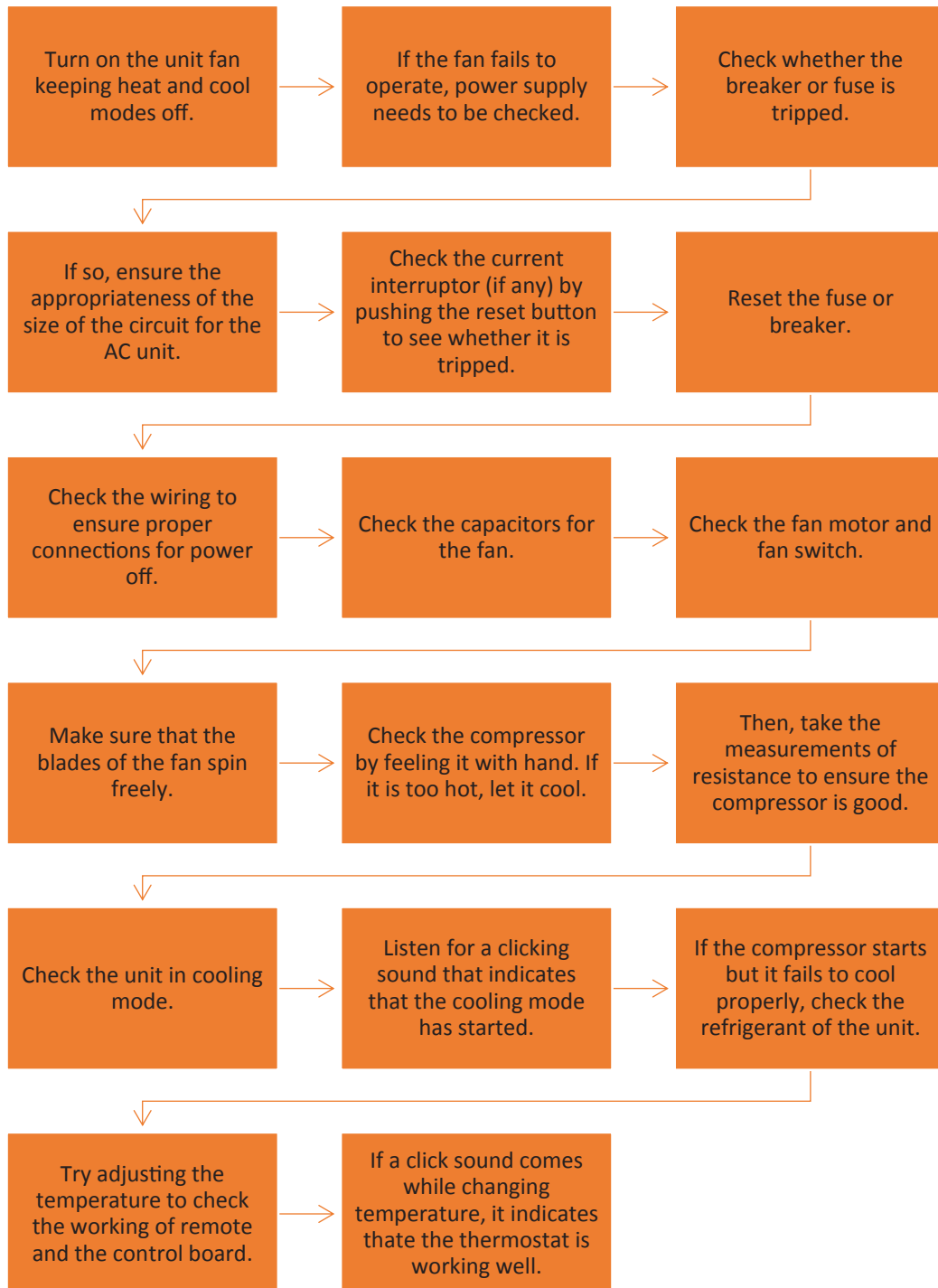


Fig. 4.3.2.1: Checking of various components

Testing the Compressor

In window AC units, rotary compressors are generally used. A field technician needs to follow the steps to test the compressor.

Step 1: Check the power outlet to make sure it is working well.

Step 2: Turn the power off and take out the unit's terminal cover by removing the mounting screws located at the four corners of the front of the air conditioner unit. Ensure that the terminals and wires are not damaged.

Step 3: Check the compressor to make sure that there is no cracked valve inside it.

Step 4: Test the electrical terminals using a multimeter. A typical unit has three terminals; C, R, and S. The continuity between every two terminals (C - R, C - S, and R - S) should be tested.

- Check the wire connections and if the wire is found faulty, replace it.
- If the resistance is higher (higher than 30 ohms), check if the compressor is hot. If so, it may be that the internal overload is open and wait for the compressor to cool down.
- If the resistance is high but the unit is cool, it indicates that the compressor motor is bad.

Step 5: Check the resistance of each of the terminals to the compressor's body. If the resistance reading is low, it signifies that the motor is grounded and the compressor needs a replacement.

Testing Capacitor of AC

The following figure lists the steps to test the capacitor of a window AC:

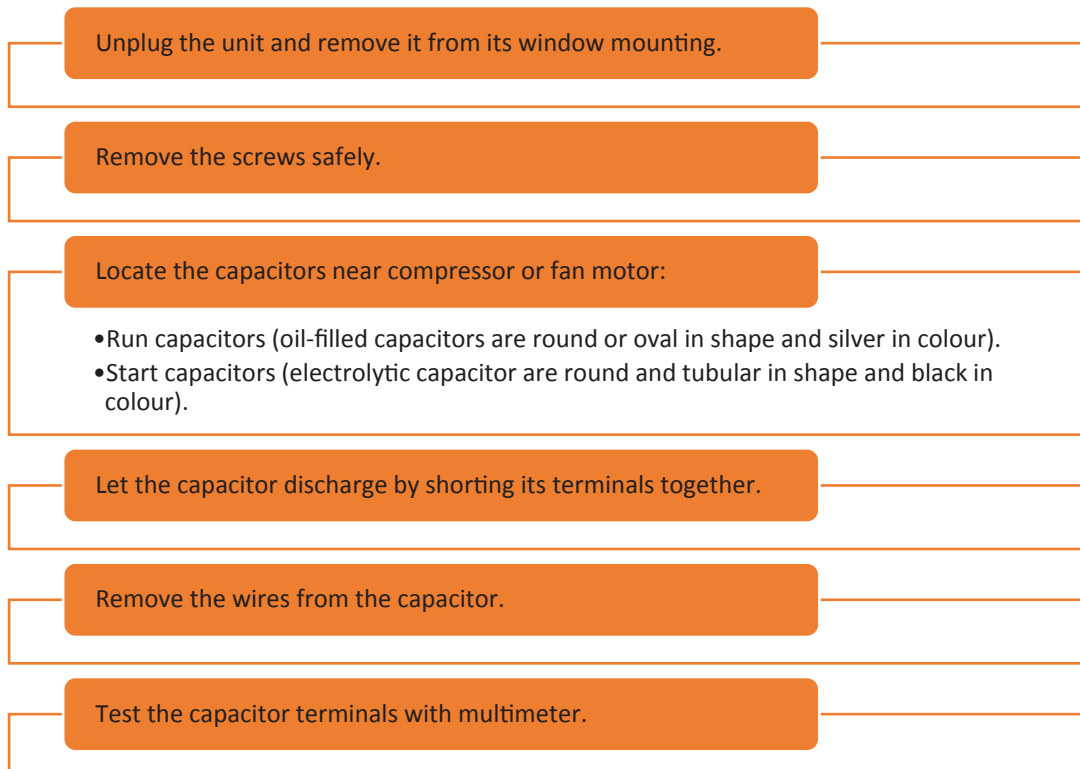


Fig. 4.3.2.2: Steps for testing the capacitors

4.3.3 Repairing/Serviceing Window ACs

An AC requires servicing and repairs due to wear and tear with usage. Improper maintenance also leads to requirement for repair. The following figure lists some categories of issues with ACs:

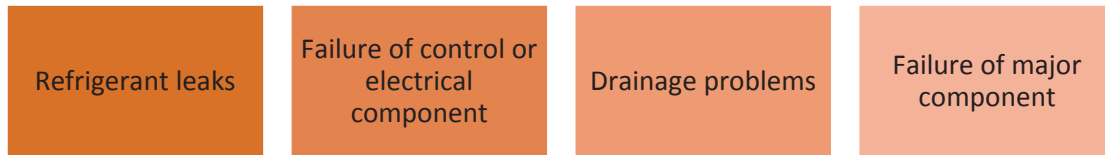


Fig. 4.3.3.1: Some categories of issues with ACs

The following figure lists some specific symptoms that indicate the air conditioner needs a servicing:

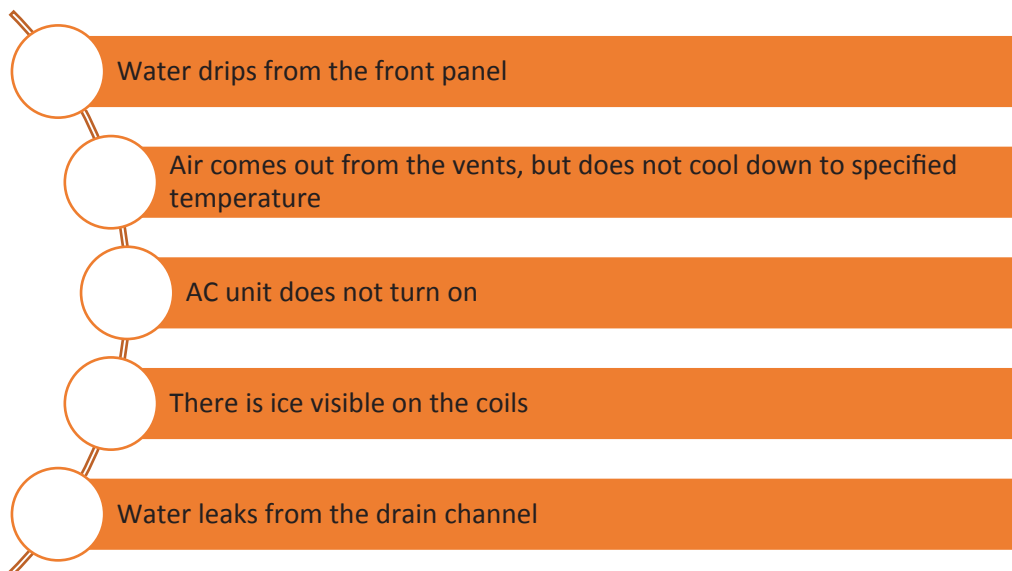


Fig. 4.3.3.3: Some specific symptoms of AC problems

A field technician needs to perform the following steps before starting the repairing:

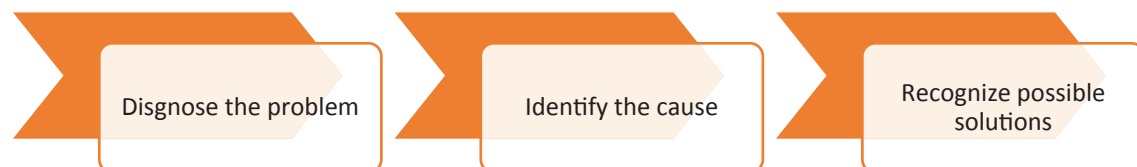


Fig. 4.3.3.4: Troubleshooting steps

The following table lists some AC problems and their possible troubleshooting steps:

Problem	Possible Troubleshooting Steps
The AC unit does not turn on	<ul style="list-style-type: none"> • Check the fuses or the breaker. • Check the wiring and the selector switch.
Air coming out from the unit is not cold enough	<ul style="list-style-type: none"> • Check that the fan selector is set to "Fan Only" mode. • Check whether the thermostat is set at high warm position. • Keep the exhaust vent control in "Open" position. • Ensure that the location of the thermostat sensing bulb is correct. • Check the cleanliness of the coils. • Check the level of the refrigerant.
The room is warm while the unit is cooling	<ul style="list-style-type: none"> • Check whether the fan selector is set to "Fan Only" mode. • Check whether the thermostat is set at high warm position. • Keep the exhaust vent control in "Open" position. • Ensure that the location of the thermostat sensing bulb is correct. • Check the position of the air directional louvers. • Ensure that the front is not blocked. • Check that the outside louvers are not blocked by bricks or anything else. • Ensure that the cooling capacity is sufficient for the room size. • Check the cleanliness of the coils. • Check the level of the refrigerant.
Water is dripping inside	<ul style="list-style-type: none"> • Ensure that the unit is slightly tilted towards the outside. • Check whether there is any blockage in the drain. If there is any obstruction, clean the drain by. <ul style="list-style-type: none"> ○ Removing the unit from the window. ○ Disconnecting the power and washing the unit. ○ Letting the unit to dry thoroughly and re-applying power.
The fins on the coils are not working properly	<ul style="list-style-type: none"> • Use fine comb to make the fins straight. • Ensure flattening is minor, as more of it will affect the operation.
The winding coil on the front side gets frozen	<ul style="list-style-type: none"> • Check the cleanliness of the coils. • Check the cleanliness of the air filter. • Ensure that the thermostat is working properly. • Check the level of the refrigerant .

AC cycles keeps On and Off very frequently	<ul style="list-style-type: none"> • Check whether the thermostat sensor is positioned properly. • Ensure that the sensor is not touching the evaporator coil. • Adjust the wire carefully. • Ensure that the front panel or the thermostat is not blocked with drapes. • Check for any refrigerant leak. • Ensure that the condenser is not covered with leaves. • Check that the fins are not damaged.
AC unit blows circuit breaker or fuses	<ul style="list-style-type: none"> • Check the size of the circuit (amps). <ul style="list-style-type: none"> ○ Most window ACs require 120 volts and can be operated in a circuit with 15 amp. A dedicated circuit may be needed by some larger units. The circuit is blown if it is shared with other loads being operated simultaneously. ○ Try running a dedicated circuit with 20 amp for the unit.

Repairing a Thermostat

Thermostat, located behind the control panel, has a special sensing bulb connected to it to sense temperature controlled by thermostat. It extends from the thermostat to area of the evaporator coil. A field technician should follow the steps shown in the following figure to service a thermostat:

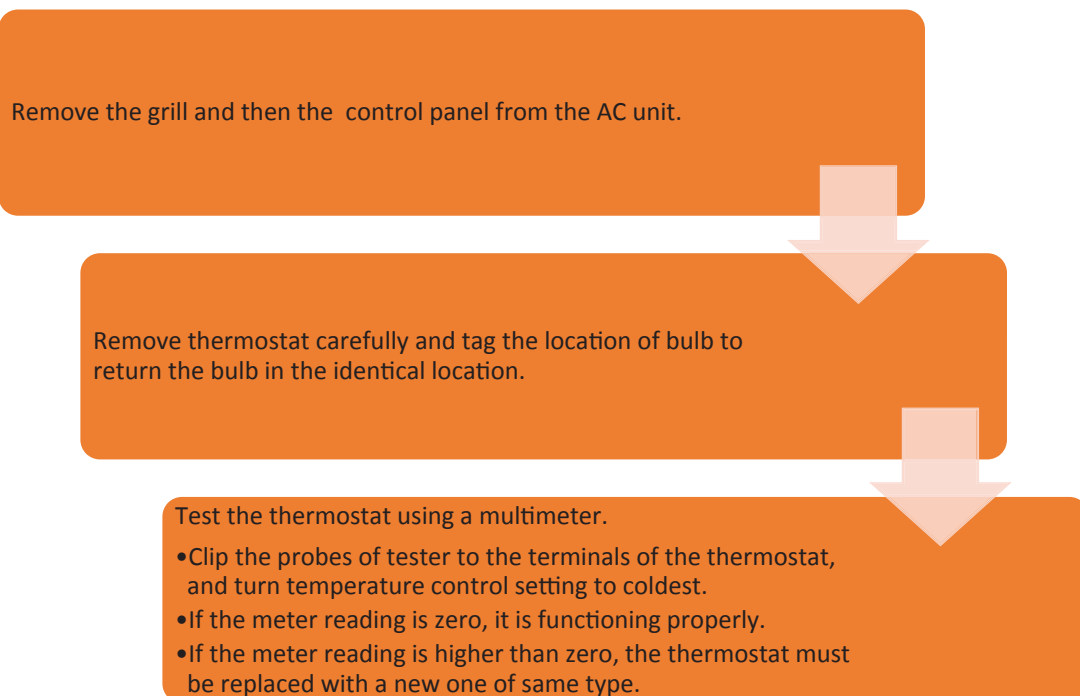


Fig. 4.3.3.5: Steps for servicing a thermostat

Repairing a Fan

Generally loose or dirty blades of a fan leads to malfunctioning. Cleaning and tightening the fan blades usually fixes the problems with fan. The following figure lists the steps to repair the fan of an AC unit:

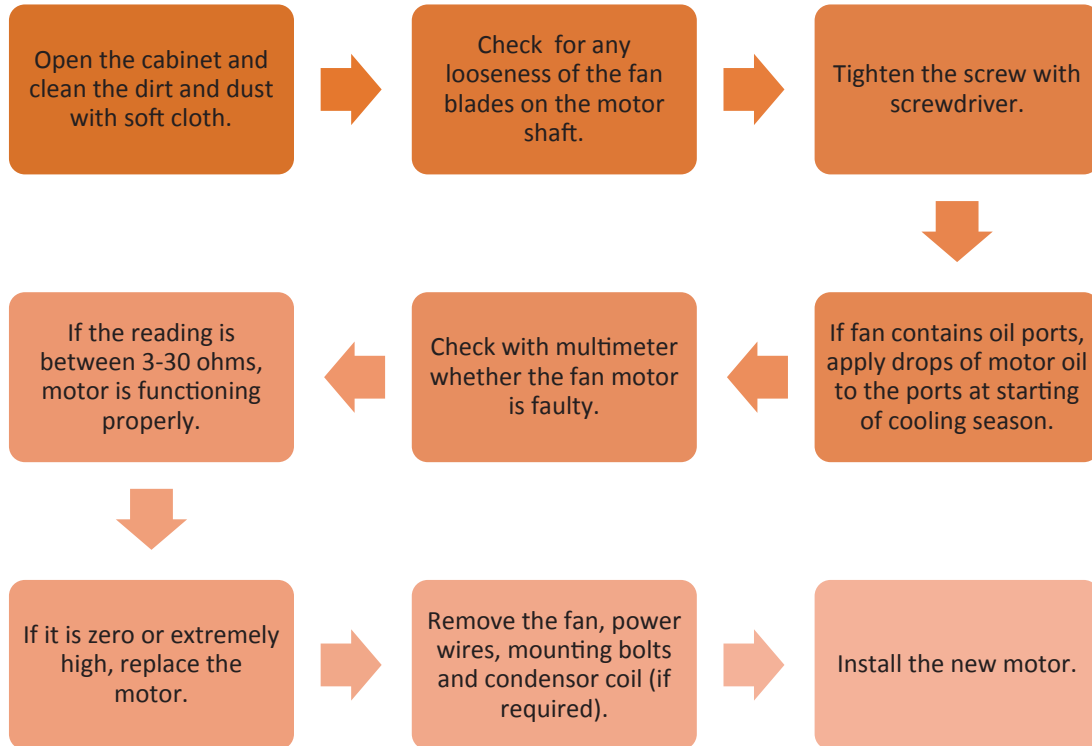


Fig. 4.3.3.6: Steps for repairing the fan of the AC unit

UNIT 4.4: Installing Split ACs

Unit Objectives

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

1. Identify the different parts and working of split ACs
2. Follow safety precautions for installation of split ACs
3. Perform IDU and ODU installation
4. Connect IDU and ODU
5. Test-run a split AC

4.4.1 Parts of a Split AC

The main reasons for split air conditioner are getting popular are their elegant looks and silent operation. There are two units in a split AC:

- Indoor unit: It is installed inside the room which cools the room.
- Outdoor unit: It is installed in open space outside the room at a convenient location for installation and maintenance.

Apart from the two units there is copper tubing that connects them.

The following figure lists the parts of a split air conditioner:

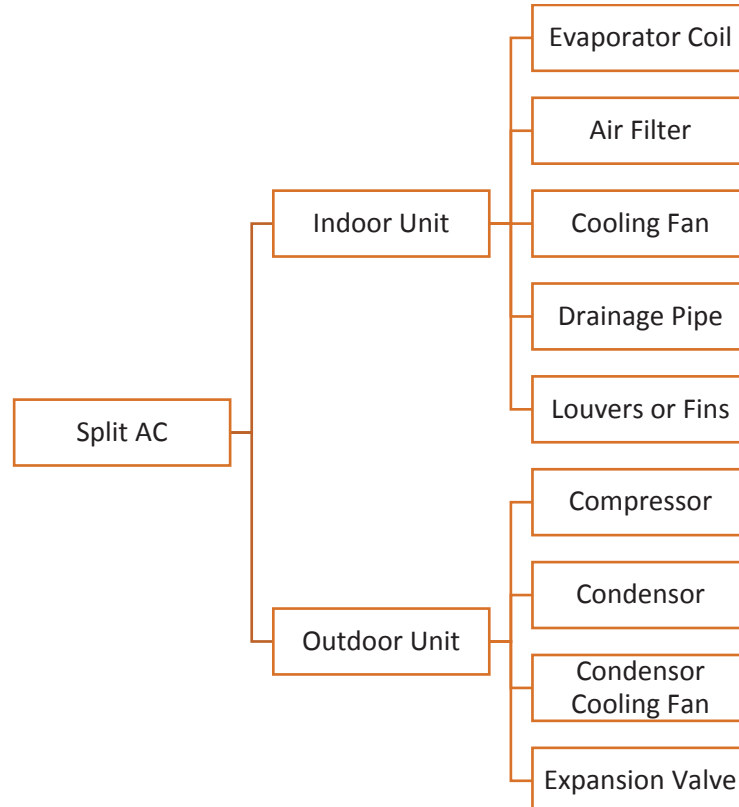


Fig. 4.4.1.1: Parts of a split air conditioner

Outdoor Unit

A great amount of heat is generated inside in outdoor unit by the compressor and the condenser. There should be sufficient air flow around the unit. The following figures show the outdoor unit of a split AC:

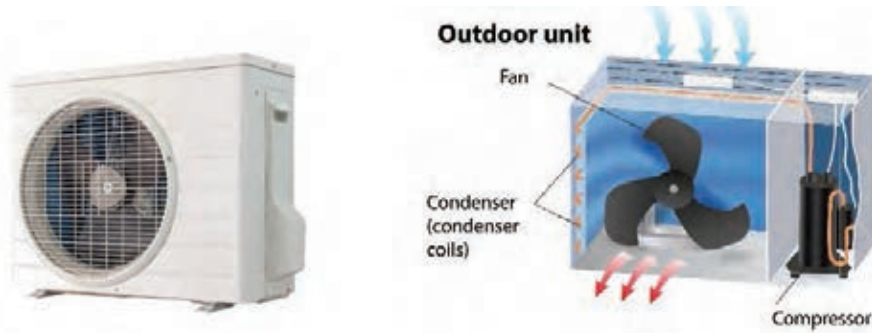


Fig. 4.4.1.2: Outdoor unit of a split AC

Compressor

The compressor increases the pressure of the refrigerant by compressing it and sends to the condenser. Compressors are of hermetically sealed type in which the motor used for driving the shaft is not visible externally.

Condenser

The condenser is the coiled copper tubing covered with the aluminium fins and contains one or more rows based on air conditioning unit size. It allows the refrigerant with high temperature and pressure received from the compressor to give up the heat. The copper and aluminium let the heat from the refrigerant be removed at faster rate.

Condenser Cooling Fan

The condenser cooling fan located in front of the condenser coil and compressor, is driven by a motor and has three or four blades. With the rotation of the blades the fan absorbs the air from the outside and with the aluminium fins blows the air over the condenser and the compressor and thus cool them. The hot air is passed to the open space allowing air circulation.

Expansion Valve

It is generally a copper capillary tubing with many rounds of coils. It allows a sudden drop of temperature and pressure of the refrigerant coming from the condenser.

Indoor Unit

The indoor unit of the split AC is comprised of a box type housing which encloses the important parts. The following figure lists the types of indoor units:

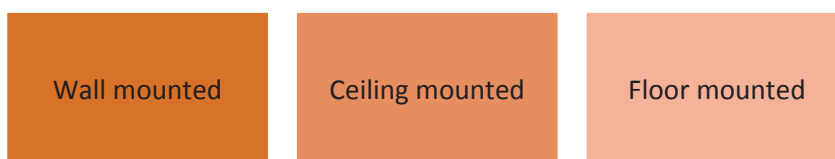


Fig. 4.4.1.3: Types of indoor unit of a split AC

The following figure shows the indoor unit of a split AC:

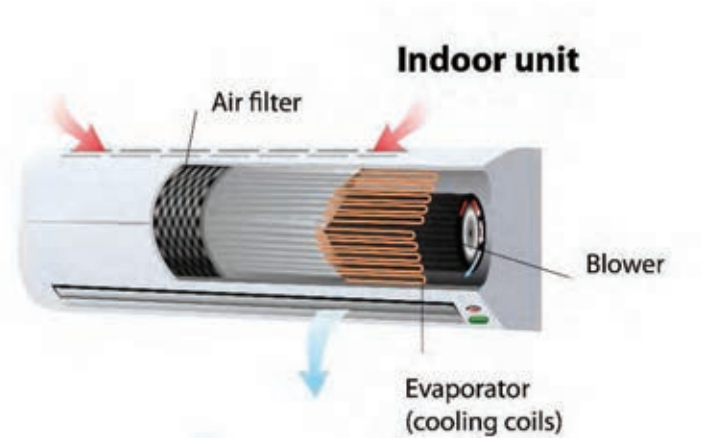


Fig. 4.4.1.4: Indoor unit of a split AC

Evaporator Coil or the Cooling Coil

It is comprised of several turns of a coil in one or more rows. The number of rows is based on the capacity of the conditioning system. The coil is encapsulated with aluminium fins so that maximum amount of heat can be transferred to the air inside the room from it. The following figure shows the working of the evaporating coil:

The refrigerant with low pressure and temperature from the tubing enters the coil.

The room air is absorbed by the blower and passed over the coil leading to cooling of air.

This cool air is then passed to the room.

Fig.4.4.1.5: Working of the evaporating coil

The temperature of the refrigerant inside the evaporating coil rises after the heat is absorbed from the room air. It passed through the copper tubing to the compressor of the outdoor unit. The refrigerant tubing of both sides are encapsulated with the insulation tape.

Air Filter

The air filter allows supply of clean air to a room by removing dirt particles from it. The room air is passed through the air filter before it is passed to the cooling coil.

Cooling Fan or Blower

It pulls in the warm and dirty air from the room and blows out cool and clean air. The fan speed can be changed as it is connected to a small motor having multiple speed options.

Drain Pipe

When the room air is passed over the cooling coil, the air temperature reaches below the dew point temperature. This results in forming of dew drops on the surface of the cooling coil due to condensation of the water vapour present in the air. These water drops are accumulated inside the indoor unit. A drain pipe is connected from the space to an external place outside where water can easily be disposed off.

Louvers or Fins

Cool air is supplied by the cooling fan into the room through the louvers that allow changing the direction of the air as per the requirements. The following figure lists the types of louvers:

- | | | |
|--------------------|---|---|
| Horizontal louvers | } | <ul style="list-style-type: none"> • They are connected to a small motor and their position can be changed using a remote control. • If the position is set to fixed chilled air is passed in a specific direction. • If it is set to rotation mode the fresh air is passed throughout the room. |
| Vertical louvers | } | <ul style="list-style-type: none"> • They are manually operated and the position can easily be set according to the requirements. • Air flow is controlled in upward and downward directions. |

Fig. 4.4.1.6: Two types of louvers

Refrigerant Piping or Tubing

The refrigerant piping comprised of copper tubing, connects the outdoor and indoor unit. It is flexible enough to be coiled easily.

The low pressure and low temperature refrigerant goes from the expansion valve to the copper tubing, that is also connected to the cooling coil at the other end. The following figure shows the connection of indoor and outdoor unit through refrigerant tubing:

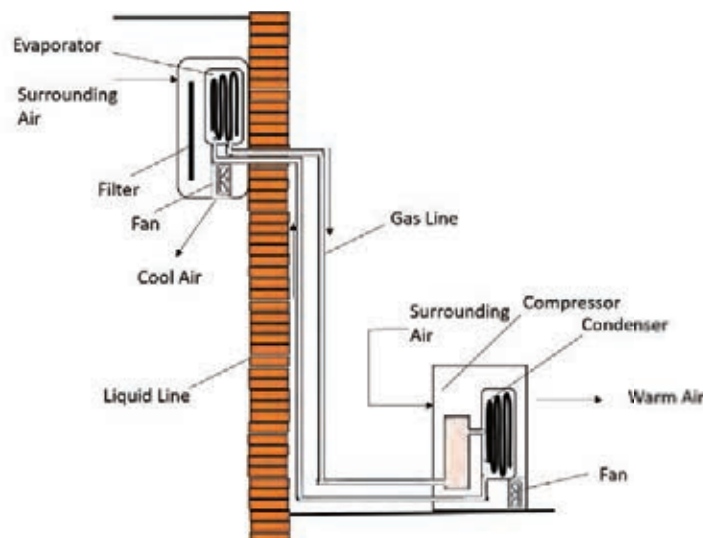


Fig. 4.4.1.7: Connection of indoor and outdoor unit through refrigerant tubing

The distance between the two units (indoor and outdoor) should be less as there is some loss of the cooling effect when the refrigerant flows through the tube.

The tubing is covered with the insulation as it is exposed to the atmosphere which may be high temperature. The cooling effect will be lost if the tubing is not covered.

There is another refrigerant tubing connecting the units for the refrigerant to travel from evaporating coil to the compressor. Both the tubings are covered using an insulation tape.

4.4.2 Precautions

It is vital to follow certain safety precautions while installing air conditioners. The following figure represents the general guidelines that should be followed to prevent any potential injury or property damage:

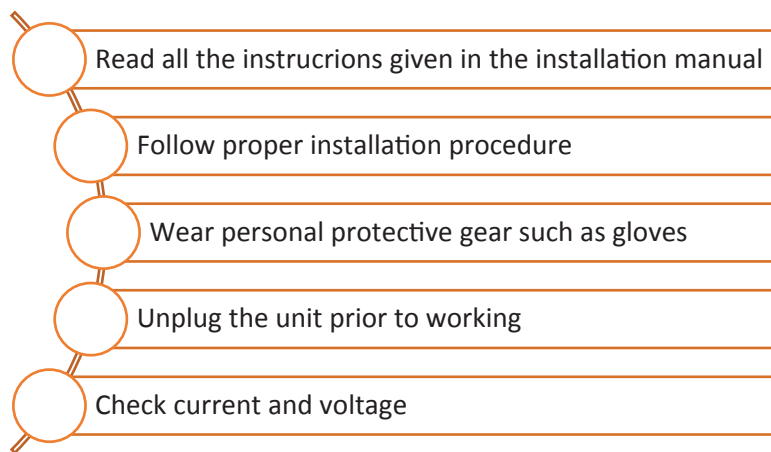


Fig.4.4.2.1: Safety precautions

Safety Precautions While Wiring

In addition to these general safety precautions, it is imperative to follow precautions while working with electrical systems. Any negligence or carelessness can cause electrical shock leading to severe personal injury or death. The following figure represents the electrical safety precautions to be followed:

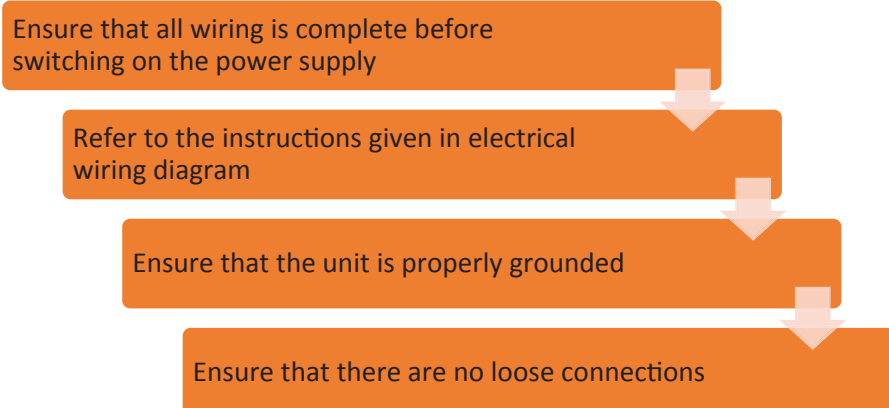


Fig. 4.4.2.2. : Electrical safety precautions

Safety Precautions While Transporting

The air conditioner units are very heavy. Special care needs to be taken to lift the units as in the following: .

- Never try to lift the unit alone.
- Always ask someone for help.
- Proper posture should be maintained when lifting the unit from the ground.
- Make sure to bend the knees to minimize any risk of back injury.
- Look out for the sharp edges and the aluminium fins of the air conditioner.

Safety Precautions While Installing

While installing, the following precautions should be taken for safety:

In a wall	<ul style="list-style-type: none"> •Ensure that the wall can bear the load of the unit. •A frame made of wood or metal must be constructed to provide additional support.
In a room	<ul style="list-style-type: none"> •Insulate the tubing that runs inside a room to avoid damage to wall and floors due to water.
In uneven or moist locations	<ul style="list-style-type: none"> •Provide a solid, level foundation for the outdoor unit. •Use a raised concrete blocks to avoid any type of abnormal vibration and water damage.
In areas with high winds	<ul style="list-style-type: none"> •Use bolts and a metal frame to anchor the outdoor unit securely . •Provide a suitable obstruction to air.
In snowy areas	<ul style="list-style-type: none"> •Install the outdoor unit on a platform that is raised higher than accumulated snow. •Provide snow outlets.

Fig. 4.4.2.3: Installation safety Precautions

Safety Precautions While Connecting Refrigerant Tubing

The following precautions need to be taken while connecting the refrigerant tubing:

- Always keep the tubing runs short
- When connecting two tubes, use flaring method
- Check for any leakage before doing the test run

4.4.3 Installation of Split AC

The first step to install a split AC is to select the best location for the installation. The following figure lists the points to be considered for location of an AC:

Do not install the unit at such a location where there is a heat source nearby

Ensure there are no obstacles in air circulation

Ensure there is proper ventilation on all sides

Ensure there is easy access to drainage

Do not install the conditioning unit near the entrance or exit doorway

Make sure that the unit is accessible for maintenance

Fig. 4.4.3.1: Installation location

Indoor Unit Installation

The steps of installation of indoor unit are as follow:

Step 1: Select an appropriate location for the unit as shown in the following figure:

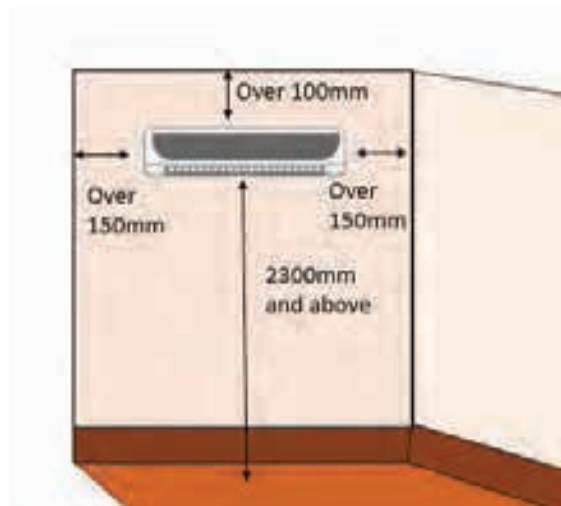


Fig. 4.4.3.2: Indoor unit installation location

Step 2: Fix the mounting plate to the wall inside the room and secure it with screws as shown in the following figure:

- Hold the mounting plate against the wall.
- Use a level to check whether the plate is levelled horizontally.
- Fix it to the wall by drilling holes in the wall at appropriate spots.
- Insert anchors into the drilled holes and secure the plate to the wall using tapping screws.



Fig. 4.4.3.3: Secure the mounting plate

Step 3: To fit the piping, drill a hole in the wall as shown in the following figure:



Fig. 4.4.3.4t: Drill a hole for piping

- Drill a hole having a diameter of around 7.5 cm through the wall.
- Make sure that the slope of the hole towards the exterior is kept downward so that adequate drainage is possible.
- Insert a flexible flange through the hole.

Step 4: Make sure that the electrical connections are proper:

- Remove the cover by lifting the front panel of the unit.
- Ensure that the wires are connected to the terminals of the screw.

Step 5: Connect the pipes:

- Run the piping towards the hole.
- Cut a length from the PVC pipe that is shorter than the length between the wall surfaces of the interior and the exterior side (around 6 mm).
- Place the cap on the end of the PVC pipe that is inside the room.
- Couple the drain pipe, the copper pipes and the power cables together using an electrical tape as shown in the following figure:

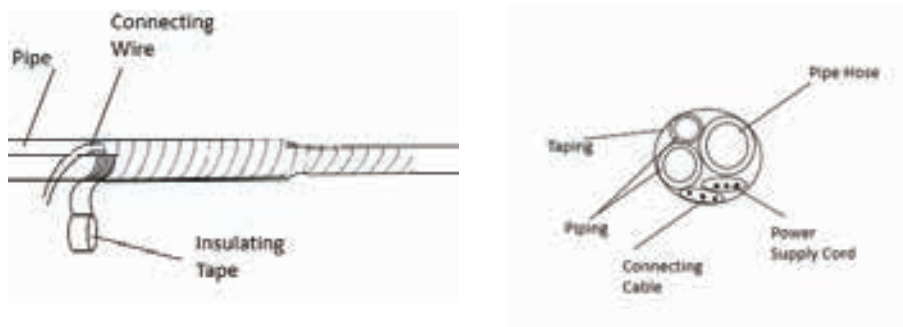


Fig. 4.4.3.5: Connect the pipes

- Tighten the connection by using 2 wrenches, working in opposite directions to secure the pipe to the indoor unit and attach the drainage pipe to the base of the indoor unit.
- Run the pipes and cables coupled together through the hole making sure that the water is drained in a proper place by the drainage pipe, and the drain hose is sloping downward for efficient drainage, as shown in the following figure:

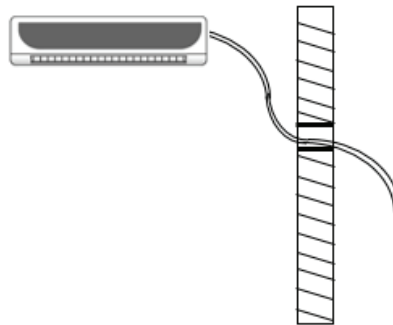


Fig. 4.4.3.6: Direction of drain hose

The following images show some examples of incorrect installation:

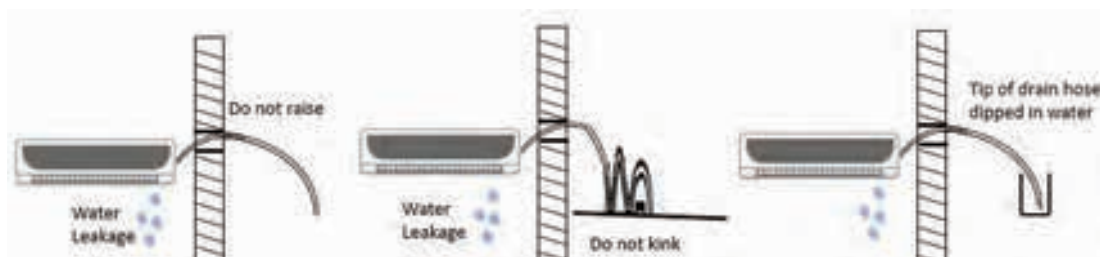


Fig. 4.4.3.7: Examples of incorrect installation

Step 6: Secure the indoor unit by pressing it against the mounting plate, as shown in the following figures:

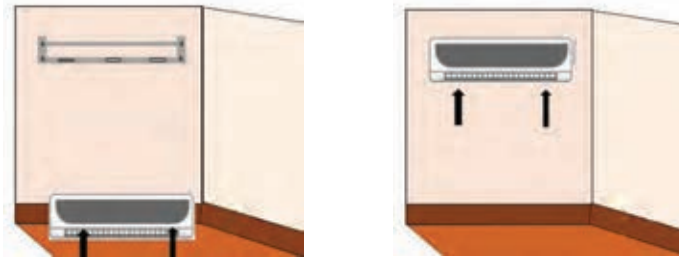


Fig. 4.4.3.8: Secure the indoor unit

Outdoor Unit Installation

The steps of installation of indoor unit are as follows:

Step 1: Select an appropriate location for the unit, as shown in the following figure:



Fig. 4.4.3.9: Outdoor unit location

Step 2: Hold the mounting plate against the outside wall:

- Secure it properly.
- Ensure that it is in a level position.
- Provide rubber cushioning under the feet of the unit so that vibration is minimized.

Step 3: Connect the wires.

- Remove the cover and connect the cables and wires consulting the wiring diagram and following the manufacturer's instructions to connect the cable wires.
- Use a cable clamp to fasten the cables.
- Replace the cover.



Fig. 4.4.3.10: Connecting electric wires

Step 4: Fasten the flare nuts to the pipes on the outdoor unit, as shown in the following figure:



Fig. 4.4.3.11: Secure flare nuts

Completing the Installation of a Split Air Conditioner

After the installation of the indoor and outdoor units of the split AC, the given steps should be followed:

Step 1: Check the amount of air and the humidity of the refrigerant circuit, performing the following steps:

- Detach the caps from the service port and the valves (both 2 way and 3 way).
- Attach the hose of a vacuum pump to the service port.
- Turn the vacuum pump on.
- Switch the vacuum pump off after closing the low pressure knob.
- Check whether the valves and joints have any leak
- Replace the caps after disconnecting the vacuum.

The following figure shows removing air and humidity:



Fig. 4.4.3.12: Remove air and humidity

Step 2: Use insulating covering and insulating tape to wrap the joints of the piping, as shown in the following figure:



Fig. 4.4.3.13 : Wrap piping joints with insulating tape

Step 3: Use clamps to affix the piping to the wall and use expanding polyurethane foam to seal the hole in the wall.

4.4.4 Test-run a Split AC

It is important to measure and record the test run properties to check whether the unit is installed properly, and to store the information after completing installation for further service. The following figure shows the items to be measured:

Temperature (inside and outside the room)	Suction and blow out temperature	Wind velocity and volume
Voltage	Amperage	Presence of noise and abnormal vibration
Piping temperature	Operating pressure	Compressive pressure

Fig. 4.4.4.1: Items to be measured

In addition to the preceding items, the structure and appearance of the unit should also be checked to ensure that it complies with the standards. The following figure shows the checks that need to be performed:

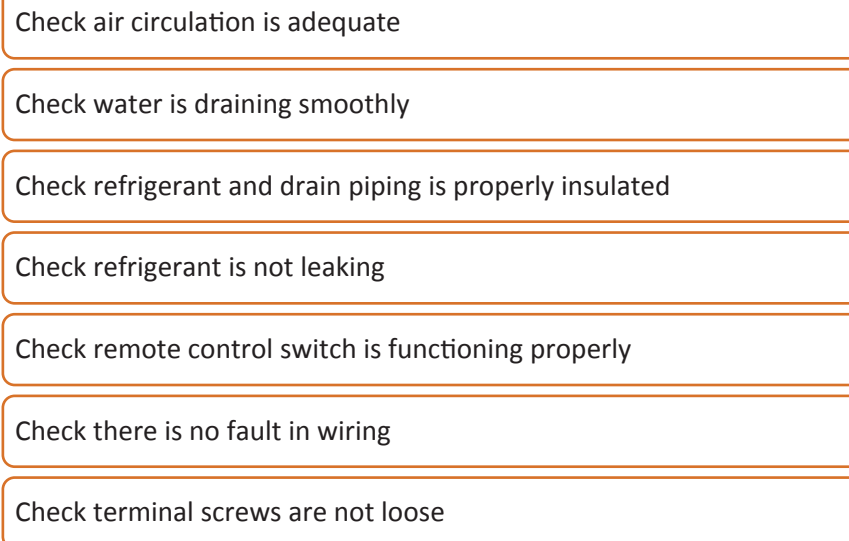


Fig. 4.4.4.2 : Checks to be performed

The following figure shows the tasks that the field technician needs to do after completing the installation:

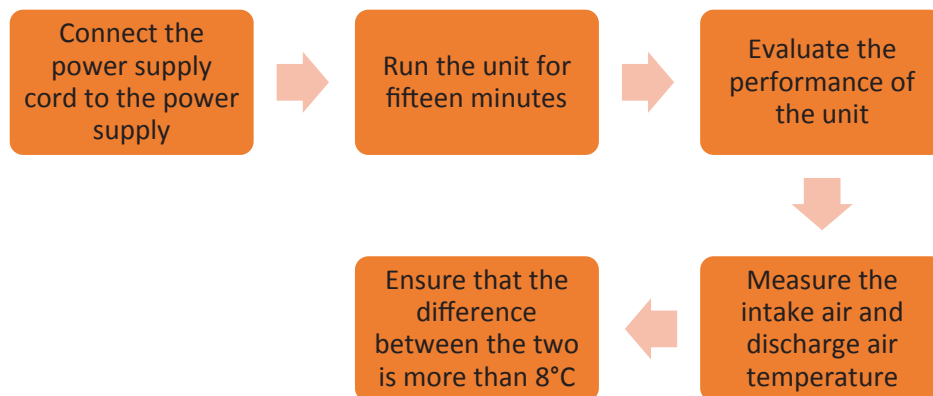


Fig. 4.4.4.3 : Tasks to be performed after installation

UNIT 4.5: Servicing Split ACs

Unit Objectives

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

1. Describe wiring diagrams for split ACs
2. Test electronic components of split ACs
3. Perform dry and wet servicing

4.5.1 Safety Precautions While Servicing

While servicing an AC, the field technician should take the following precautions:

- While working with electrical parts and connection, switch off the power at the main power box.
- Keep fingers as well as clothing away from the moving parts.
- Clean the site after installation is finished, ensuring that there are no metal scraps of wiring left inside the unit which is being serviced.

4.5.2 Wiring Diagram of Split AC

A field technician is required to service and repair the split ACs as per customer requests and complaints.

To be able to carefully service and repair an AC, the field technician should be able to read and understand the wiring diagrams of the ACs and understand the electric circuits and connections properly. A typical wiring diagram of a split AC is shown in the following figure:

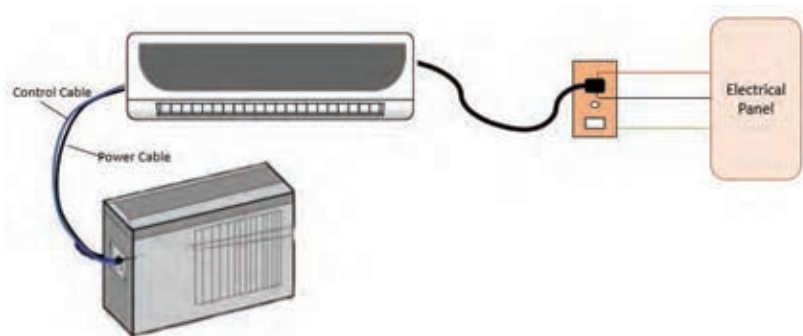


Fig. 4.5.2.1 : Typical wiring diagram of a split AC

The following figure shows the wiring diagram of a split AC outdoor unit:

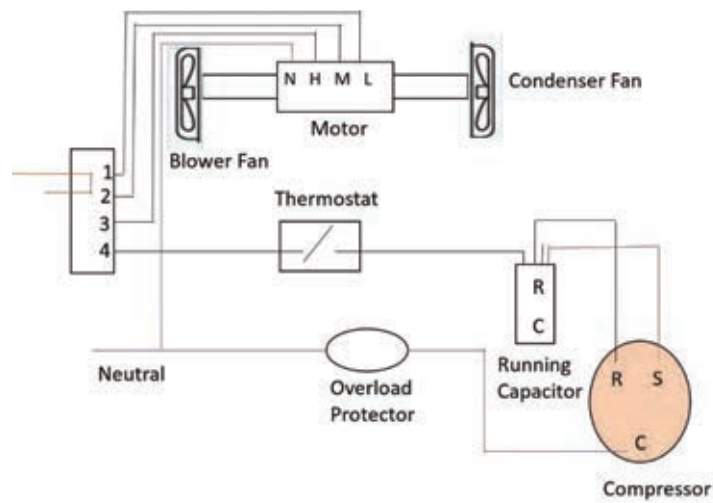


Fig. 4.5.2.2: Wiring diagram of the outdoor unit of a split AC

4.5.3 Perform PMS (Dry and Wet Servicing)

Dry servicing refers to quick servicing of the AC which should be done every six months. Wet servicing is detailed cleanup of the AC units that should be done once in a year.

Steps for Dry Servicing

For indoor unit the steps for dry servicing are as follow:

Step 1: Open the cover and take the filter out as shown in the figure:



Fig. 4.5.3.1: Taking the filter out

Step 2: Clean the coil to remove the dust by using a brush as shown in the following figure:



Fig. 4.5.3.2 : Cleaning the dust

Step 3: Wash the filters as shown in the following figure and put them back in their places.



Fig. 4.5.3.3 : Washing the filter

The field technician should also clean the outdoor unit to remove the dust and check the drainage pipe. The following figure shows cleaning of outdoor unit:



Fig. 4.5.3.4 : Cleaning of outdoor unit

Steps for Wet Servicing (Indoor Unit)

The steps for cleaning the indoor unit are as follow:

Step 1: Remove the cover and the filters and then remove the front cabinet after unscrewing it as shown in the following figure:



Fig. 4.5.3.5 : Remove the front cabinet

Step 2: Hang the wash bag around the indoor unit especially the fan coil unit as shown in the following figure:

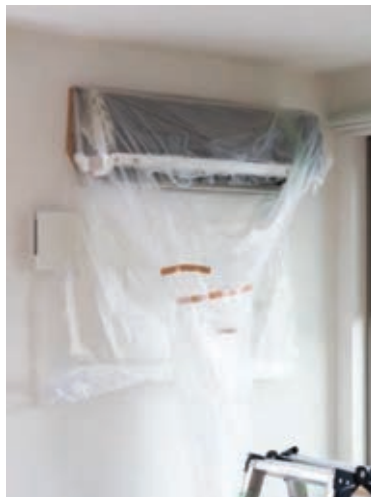


Fig. 4.5.3.6: Hanging the wash bag around the indoor unit

Step 3: Spray the cleaning agent on the rotary blades and coils and wash them after 10-15 minutes. The following figure shows cleaning the indoor unit:



Fig. 4.5.3.7 : Cleaning the indoor unit

Step 4: Remove the bag filled with water.

Step 5: Wash the filter, front cover and the front cabinet and then fix them to the proper place. The following figure shows washing on front cover:



Fig. 4.5.3.8 : Washing front cover

The steps for servicing the outdoor unit are as follow:

Step 1: Open the main connection cover and measure the voltage and current as shown in the figure:



Fig. 4.5.3.9 : Measuring voltage and current

Step 2: Measure pressure of the service valve using manifold gate. The following figure shows measuring of pressure:



Fig. 4.5.3.10 : Measuring pressure using manifold gate

Step 3: Remove the wires after switching off the power.

Step 4: Remove the fan unscrewing it using T spanner. The following figure shows the parts of outside unit:



Fig. 4.5.3.11 : Parts of outside unit

Step 5: Remove fan motor and cover the outdoor connection box.



Fig. 4.5.3.12 : Covering the connection box

Step 6: Spray coil cleaner and wash the coil and compressor and clean the outdoor body and other parts.

Step 7: Wash the fan and let it dry.

Step 8: Fix the parts to their correct position.

UNIT 4.6 Environmental Impact of Air Conditioning

Unit Objectives

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

- 1 Describe the impact of AC on environment
- 2 Describe the various types of refrigerant used in RAC system
- 3 Describe GWP and ODP of various refrigerants
- 4 Describe the various types of solvents used in RAC system cleaning
- 5 Describe GWP and ODP of various solvents
- 6 Describe environmental impact and health hazard of using CTC
- 7 Describe good working practice of using chemicals
- 8 Describe first aid procedure

4.6.1 Introduction – Environment & AC

Air conditioning has become a basic necessity of the society for staying cool and comfortable especially in hot conditions.



Fig. 4.6.1.1 Wide use of Air Conditioning

Air conditioning impacts environment adversely directly as well as indirectly as explained below :

1. High Consumption of Electricity – Air Conditioning system consumes high electricity thus putting a strain on electricity generation industry which in turn leads to increased pollution as a result of high consumption of fuels namely coal and petroleum products.



Fig. 4.6.1.2 High Electricity Requirement



Fig. 4.6.1.3 Thermal Power Plant

2. Releasing Poisonous Gas - Air conditioning is increasing pollution by releasing poisonous gases into the environment. These gases have a negative impact on environment as they are part of the Greenhouse Gases which traps heat thus having global warming and ozone depletion potential. Most of the harmful CFC or chlorofluorocarbons gases have been restricted by Montreal Protocol, but the gases that are still being emitted have a huge impact on global warming. By Year 2050, It is estimated that 27% of all global warming will be due to the gases emitted from air conditioning system.

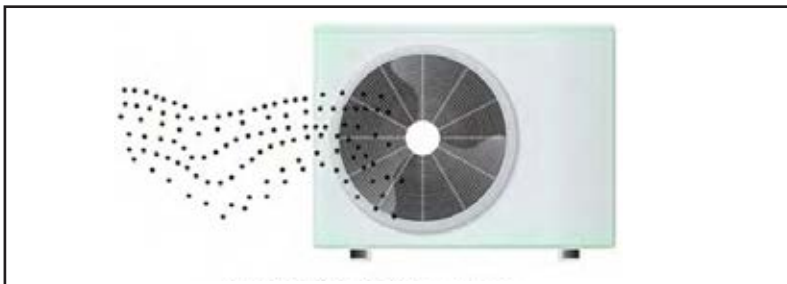


Fig. 4.6.1.4 Releasing Poisonous Gases



Fig. 4.6.1.5 Global Warming Potential

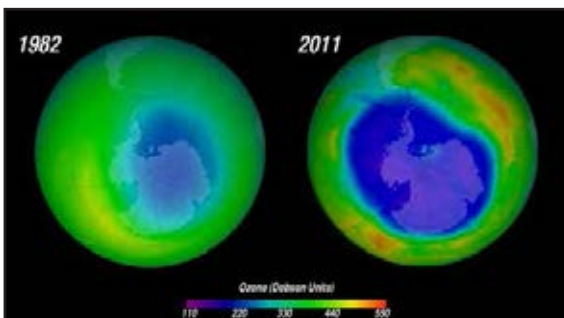


Fig. 4.6.1.6 Ozone Depletion Potential



Fig. 4.6.1.7 Montreal Protocol

4.6.2 Refrigerant

Basic of Refrigerant

A refrigerant is a fluid that is used in air conditioners and refrigerators, to take heat from the contents of a refrigerator or the room (in the case of ACs) and throw the heat out in the atmosphere. It undergoes phase transitions from a liquid to a gas and back again. Many working fluids have been used for such purposes

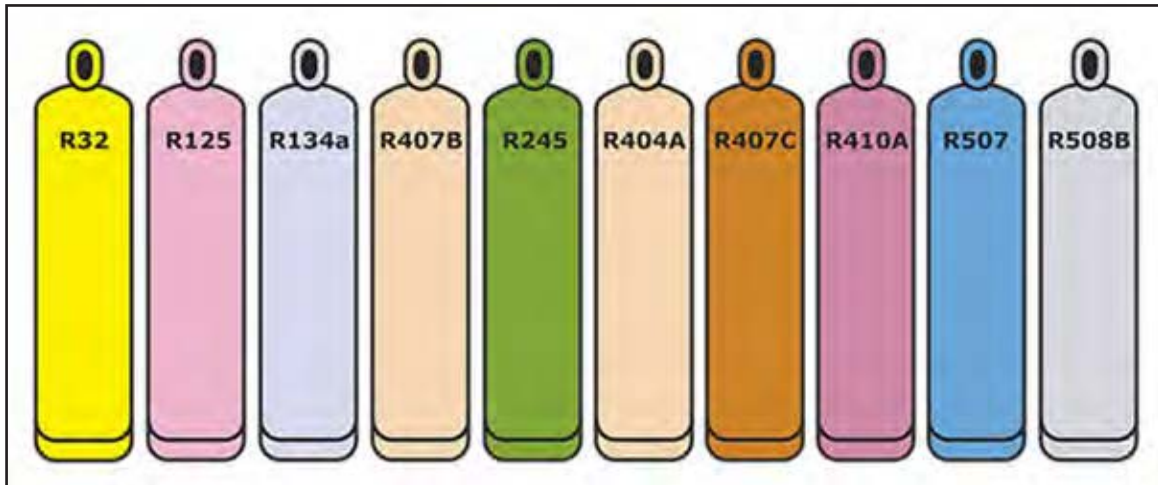


Fig. 4.6.2.1 Various Refrigerant

The ideal refrigerant would have favourable thermodynamic properties (such as boiling point below the target temperature, high heat of vaporization, moderate density in liquid form, relatively high density in gaseous form, and a high critical temperature), be noncorrosive to mechanical components, and be safe, including freedom from toxicity and flammability. It would not cause ozone depletion or climate change.

Types of Refrigerant

CFC or chlorofluorocarbons : CFCs are non-toxic, non-flammable chemicals containing carbon, chlorine, and fluorine. It was the common refrigerant in the past and commonly called as Freon. Freon was a brand name for a refrigerant “R-12” by DuPont. These refrigerants were developed more than 70 years ago and are harmful to our respiratory systems and the ozone layer. Their production was phased out since 1995 but is still being used widely in existing residential air conditioning units as many equipments have a lifetime of up to 30 years.



Fig. 4.6.2.2 CFCs

HCFCs or hydrochlorofluorocarbon : In the 1990s and 2000s, the CFCs were replaced with HCFCs and the most common HCFC is “R-22”. 50-60% of Air Conditioners in India still use HCFCs. However, HCFCs are just marginally better consists of methane or ethane in combination with chlorine and fluorine which is harmful for the environment.



Fig. 4.6.2.3 HCFCs

Hydrochlorofluorocarbons enter the body primarily by inhalation of air containing hydrochlorofluorocarbons or by dermal contact also. Inhalation of air containing high levels of hydrochlorofluorocarbons may lead to health effects including chest tightness, irritation of the respiratory tract, and breathing difficulties. Exposure to high levels of some hydrochlorofluorocarbons may also affect the nervous system, heart, liver, kidney and reproductive system. Ingestion of some hydrochlorofluorocarbons may cause nausea, headache and dizziness. Dermal contact with some hydrochlorofluorocarbons may also cause skin irritation. As per Indian Government’s plan, HCFCs will be phased out by the year 2030

HFCs or Hydro Fluoro Carbons : HFCs are colourless, odourless, non-flammable, chemically stable and un-reactive gases containing carbon, hydrogen and fluorine. This has been manufactured by removing chlorine from the refrigerant. HFCs are better than HCFCs due to energy efficiency, do not deplete ozone layer but being a green house gas they do have the potential for global warming. Though HFCs have Global warming potential in between 100 to 3000 times that of carbon dioxide but still they play small role compared to other greenhouse gases.



Fig. 4.6.2.4 HFCs

At environmental concentrations HFCs pose little threat to human health but at higher concentrations they are thought to be mildly toxic and possibly carcinogenic.

The most common HFC used in air conditioners is R-410A. A few more HFCs that are commonly used are: R-32 in Air Conditioners and R-134A in refrigerators. R-32 is better than R-410A in terms of global warming potential. India is planning to phase out HFCs in next few years though about 20-30% of the air conditioners in India still use HFCs.

HC or Hydrocarbons : It is the most environment-friendly refrigerants available in Indian market and are referred as “R-290” and “R-600A”. Their chemical names are “Propane” for R-290 and “Iso-Butane” for R-600A. They are completely halogen free, have no ozone depletion potential and are lowest in terms of global warming potential. They also have high-energy efficiency but are highly flammable as they are hydrocarbons. But they are the greenest refrigerants in the market. Manufacturers, who use these refrigerants, claim that they have taken good care in using these refrigerants and the appliances are absolutely safe. In fact, most refrigerators in the Indian market are now on R-600A and there are no reported incidents of any accidents due to the same. So we can comfortably believe that they are safe.



Fig. 4.6.2.4 HFCs

GWP and ODP of various refrigerants

GWP : The Global Warming Potential (GWP) is used to compare the abilities of different greenhouse gases to trap heat in the atmosphere. This is done by calculating the amount of heat that is trapped by a specific quantity of a greenhouse gas and then comparing it to the amount of heat trapped by an equal quantity of carbon dioxide over a fixed period of time, which is usually 100 years. Carbon dioxide is used as the base for all the calculations, so its GWP is 1. Substance having higher value of GWP is contributing more heat in the environment.

ODP : Ozone Depletion Potential (ODP) is the ratio of calculated ozone column change for each mass unit of a gas emitted into the atmosphere relative to the calculated depletion for the reference gas CFC 11 for which ODP is 1.0. Substance having higher ODP is having higher damage rate to earth’s protective Ozone layer.

Refrigerant	Global Warming Potential	Ozone Depletion Potential
R22	1810	Medium
R-410A	2088	Zero
R-32	675	Zero
R-134A	1430	Zero
R-290	3	Zero
R-600A	3	Zero

Table. 4.6.2.1 GWP & ODP of Refrigerant

4.6.3 Solvent (System Cleaning)

Air Conditioning System Contamination

Contamination can be defined as any substance which should not be in that particular air conditioning system, e.g. moisture. But do note that the incorrect oil can also be a contaminant. In short we can say that anything that should not be in that particular system is a contaminant

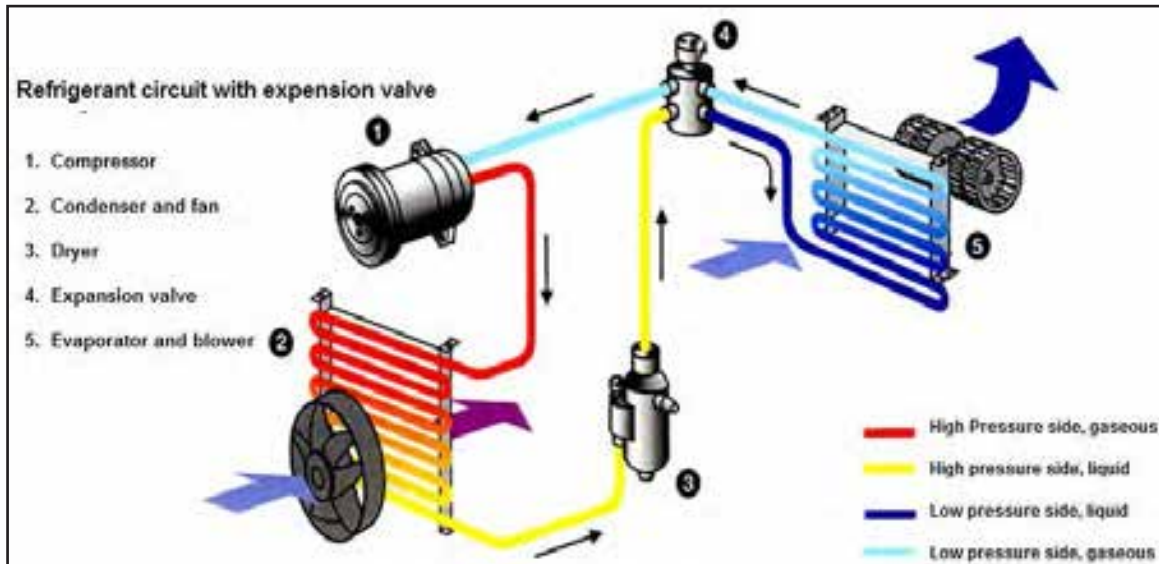


Fig. 4.6.3.1 AC Functional Diagram

Air conditioning systems can be contaminated with metal particles from the normal wear of the compressor and tiny amounts of water moisture. Contamination can cause a system to fail. Protection against contamination is provided by the filter screen on the Expansion Tube and the desiccant in the bottom of the dryer or accumulator. Other forms of contamination may be the wrong kind of oil, wrong kind of liquid charge or other material that will interfere with the cooling system. Almost 100% of moisture is normally removed from the system when it is evacuated prior to installing, but flushing the entire system will be the only way to remove all particles. Even after flushing it is important to make sure the system is clean.



Fig. 4.6.3.2 - Accumulator



Fig. 4.6.3.3 - Expansion Valve

The refrigerant and oil circulate through the refrigeration loop during compressor operation. Over time, it will get contaminated with rust due to moisture, desiccant or metal particles from a failed compressor. These impurities will travel with the refrigerant oil mixture and settle throughout the system.

All air conditioners have a component that contains a chemical (desiccant) that absorbs moisture. If it is located on the high pressure side, (between the condenser and the evaporator) it is called a filter drier or receiver drier. If the component is located on the low pressure side, (between the evaporator and the compressor) it is called an accumulator. In either case it is simply a metal tank containing a moisture absorbing chemical. Air also enters the system through loose fittings, deteriorated o-rings, and schrader ports. Even



Fig. 4.6.3.4 Filter Drier

though the air conditioner has refrigerant in it, which means the pressure in the inside of the system is greater than the outside; air will still enter the system. We also know that air contains moisture.

The important thing is that at some point, usually between one and three years of installation, the drier is no longer able to absorb the moisture. This moisture will mix and react with the refrigerant to form various acids. The acid will eat away at the metal surfaces and rubber hose, flaking off bits of material that will collect at the filter drier/accumulator screen, expansion valve, orifice tube, and the compressor. This debris will slow or stop the flow of oil from returning to the compressor and will cause compressor failure.



Fig. 4.6.3.5 Evaporator



Fig. 4.6.3.6 Condenser

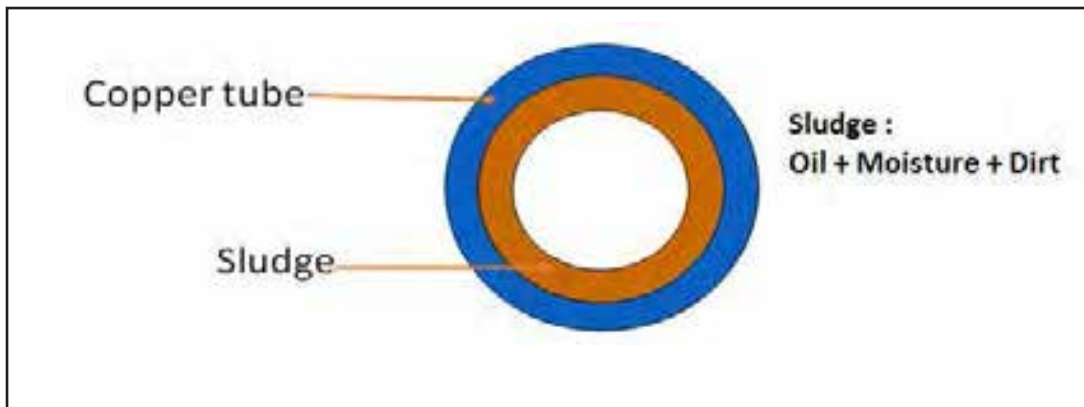
Evaporators, especially aluminium units, commonly fail because of leaks that develop at the bottom of the core. These leaks are caused by acids that collect at the bottom of the evaporator and cause a pin-hole in the thin aluminium tube. Condensers, including those made of copper, steel or aluminium also develop leaks from acid eating. Sludge and debris at the bottom of the evaporator coil will not normally cause a restriction but will eventually cause reduced cooling efficiency.

Reasons for System Contamination

Reasons for system contamination are as follows:

- Moisture
- Non-Condensable
- Oil Contamination
- Chemical Residues
- Dirt, Dust, Metal Particles
- Organic Chemical/Contaminants
- Cross-Contamination through import of contaminants from other systems or servicing equipment

Effects of contamination



4.6.3.7 Sludge Formation

Effects of contamination are as follows :

- Capillary diameter is reduced
- Reduced System Performance due to :
- Capillary getting choked
- Increased condensing temperature and pressure
- Reduced compressor life due to higher head pressure

Reasons for Sludge Formation

Reasons for sludge formation are as follows :

- Incorrect method of flushing and leak testing using air
- Use of petrol or other chemicals for cleaning
- Improper process of evacuation
- Self-evacuation using system compressor
- Use of old compressor instead of vacuum pump
- Use of anti moist / anti choke chemicals
- Use of contaminated / used refrigerants

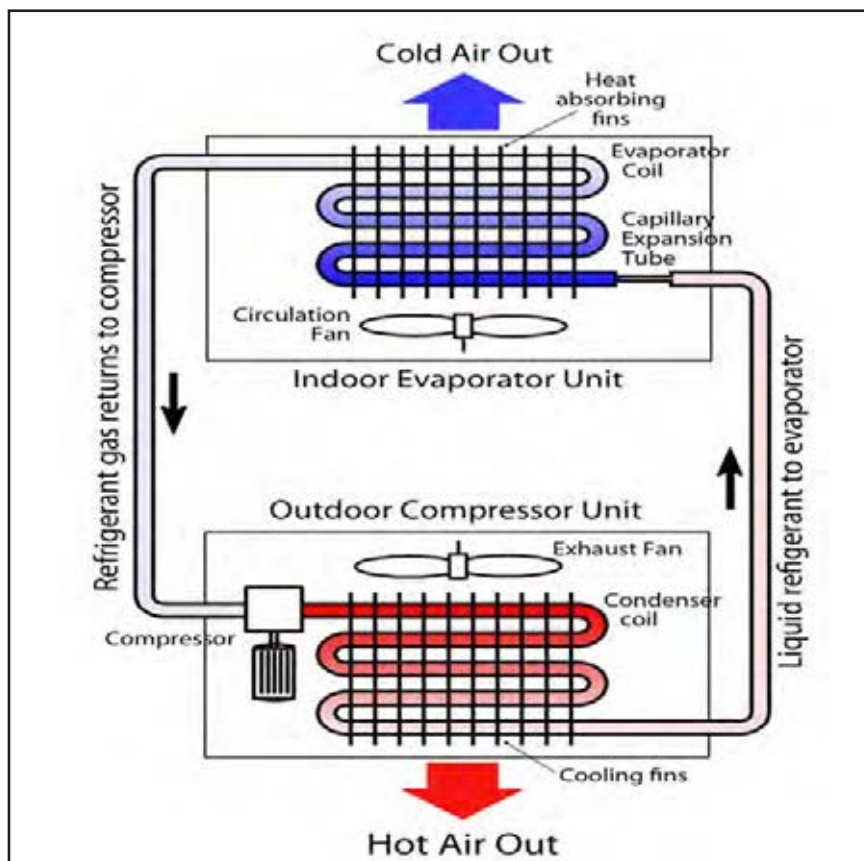
RAC System Cleaning

Fig. 4.6.3.8 AC Unit

Flushing

Once an AC system has been contaminated or has suffered a failure, the most important part of the AC service is to restore the cooling performance of the system by flushing. It is performed in order to remove all contamination (dirt) from the system. The smallest particle of contamination causes restriction and problems for a good function of the replaced compressor. It takes less than 1/10 of a teaspoon of debris (dirt) to completely restrict flow of refrigerant and oil in the typical auto AC system. Cleanliness and proper flushing procedures are very important.

Why / When flushing ?

The AC compressor must be lubricated at all times. The AC compressor is the only moving part in the entire system and the only reason for oil in the system. The oil is being circulated throughout the system, that means that all the components (condenser, hoses, tubes, evaporator, drier, accumulator) have some coating of oil internally. If any dirt, debris or contamination happened in the system all components are affected. Removing the oil (and oil film inside the components) will eliminate all of the contamination from the AC system. It's the oil that attracts and holds contaminants within the system.

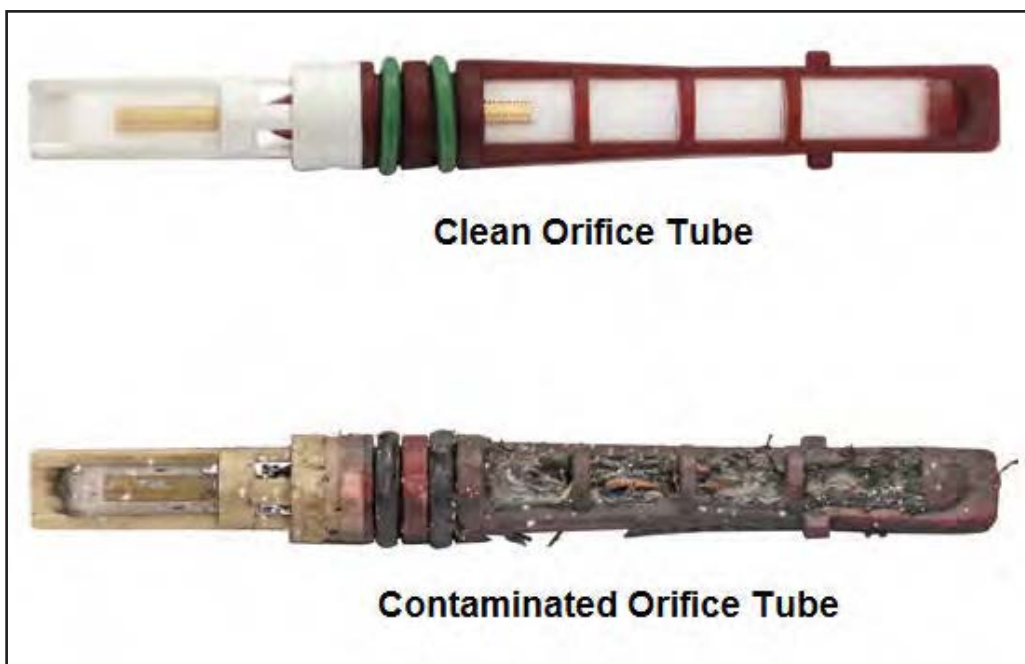


Fig. 4.6.3.9 Orifice Tube

The AC system must be flushed whenever the AC compressor is being replaced / removed or whenever there is indication of contamination within the system. Make it a habit to remove and inspect the orifice tube (if the system is so equipped). The orifice tube inlet filter screen will always tell a story about the condition of the auto AC system. Any debris or foreign material found on the orifice tube should cause you to look for other indications of contamination.

Components should not flushed

Never flush following components:

- High side muffler assemblies
- Receiver driers
- Accumulators
- Compressor.
- Expansion valves or orifice tubes

Materials need cleaning in RAC

Following components needs to be cleaned:

- Copper Tubes
- Aluminum Tubes
- Bundy/ Steel Tubes

Solvents :

The industry is increasing its awareness of the importance of coil cleanliness in refrigeration systems. Compressor manufacturers have determined that more than 95% of compressor burnouts and failures are related to contaminated or dirty systems. If these contaminants are not completely removed from the system, it can cause repeated compressor burnout and failures.

Environmental problems due to usage of following procedures -

Use of R-11 or R-12: for cleaning the interior compressor coils by spraying liquid R-11 or R-12 directly into the interior of condenser and evaporator coils. These solvents were inexpensive, easy to use and legal to vent into the atmosphere and were able to flush out contaminants and then evaporate, leaving the coils clean, residue-free. This cleaning process is no longer legal. In addition to having phased out the production of CFC refrigerants, the Montreal Protocol prohibits the use of liquid refrigerants such as R-11 or -12 as a solvent and cleaner when vented into the atmosphere.

Use of CTC - It was poured in the circuitry and flush with nitrogen for the required cleaning purpose. Although CTC is very popular, it is an ozone depleting substance (ODS). Another adverse impact of CTC is its contribution to global warming. At the workplace CTC is an occupational health hazard. CTC is very toxic and is absorbed in the gastrointestinal, respiratory system and the skin. Use of other Solvents - many enterprises was using solvents like petrol and NC thinner. It is not desirable to use these solvents as they can leave residues in the system which in the presence of oil and moisture can later form into a sludge.

Alternative Solvents – Lesser impact on Environment

In market following solvents are available:

Hexane

Methylene dichloride (MDC)

Perchloro ethylene (PCE)

Toluene

White Petrol

Alternative Solvents: Recommended for use

Methylene dichloride (MDC) – It is having good solvency power, Non flammable and leaves no residues but the disadvantage is that its evaporation rate is very high.

Hexane - It is having good solvency power and leaves no residues but the disadvantage is that it is highly flammable.

4.6.4 Environmental Impact of CTC

Carbon Tetrachloride, (CTC) CCl_4 , a colourless, dense, highly toxic, volatile, non-flammable liquid possessing a characteristic odour/ sweet smell and belonging to the family of organic halogen compounds, used principally in the manufacture of dichlorodifluoromethane (a refrigerant and propellant). It is used in fire extinguishers, textile, RAC, Jewellery making, as a precursor to refrigerants and as a cleaning agent in many industries. Circuitry has been cleaned with Carbon Tetrachloride (CTC) by a large share of RAC service enterprises over decades. It produces satisfactory results and is considered workable.

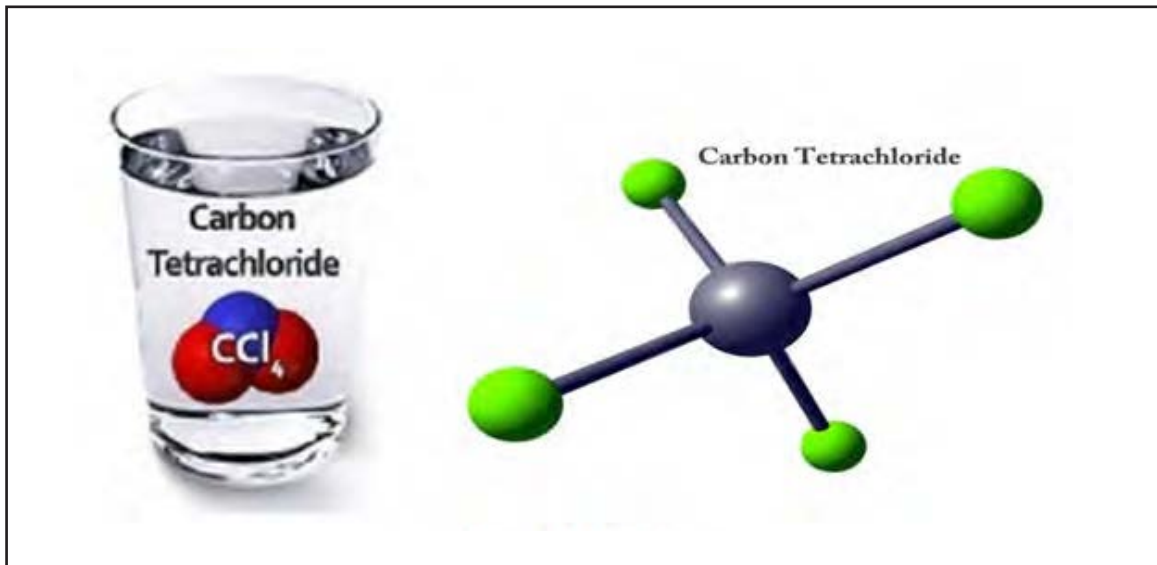


Fig. 4.6.3.3 - Expansion Valve

As a solvent and cleaning agent Carbon tetrachloride (CTC) is used widely across many industry segments. Its high solvency power, low cost and the fact that it is non-flammable made it popular in many cleaning applications.



Fig. 4.6.4.2 Cleaning Application

Although CTC is very popular, it is an ozone depleting substance (ODS) like chlorofluorocarbons (CFCs). It destroys the stratospheric ozone layer. The ozone layer protects life on our planet from harmful ultraviolet-B (UV-B) rays. The thinning out of the ozone layer in the stratosphere increases the earth's exposure to UV-B radiation which affects both human and animal life. It increases the incidence of skin cancer, eye cataract, suppresses the human immune system, reduces crop yields and affects aquatic life. Another adverse impact of CTC is its contribution to global warming. The global warming potential (GWP) of CTC is about 1,400 times higher than that of carbon dioxide (CO₂), the main greenhouse gas.

At the workplace CTC is an occupational health hazard. CTC is very toxic and is absorbed in the gastrointestinal, respiratory system and the skin. It is then distributed throughout the entire body. Highest concentrations are accumulated in liver, brain, kidneys, muscles and blood. CTC affects the central nervous system (CNS) severely, causing headache, weakness, lethargy, nausea and vomiting. Inhalation of high levels can damage the liver and kidneys. The severity of the effects depends on the route and frequency of exposure as well as co-exposure to other chemicals. CTC is proven to cause cancer in animals and is a suspected human carcinogen.

The Montreal Protocol

To protect the ozone layer, India, along with more than 190 countries has signed the Montreal Protocol to phase out production and consumption of CTC and other ozone depleting substances. Under this agreement India has committed to phase-out the use of CTC as a solvent completely by 31st December 2009.

As the phase-out is progressing, CTC supplies in the market are dwindling rapidly. Beyond 2009 CTC is not available for solvent uses. Given the reduction of supply, the price of CTC has risen substantially. Consequently, CTC is costlier today than most of its alternatives.

Ozone-depleting substance	Total Phase-out by 1 st January of the year	
	Developed Countries	Developing Countries
CFCs	1996	2010
Halons	1994	2010
CTC	1996	2010
Methyl Chloroform	1996	2015
Methyl Bromide	2005	2015
HCFCs	2020*	2030*

Tab. 4.6.4.1 CTC Phase-Out Calendar

Alternatives to CTC

No alternative is ideal in all regards and each one has certain disadvantages. The listing below shows the range of criteria that should be considered for the substitution of CTC for circuitry cleaning.

- Good cleaning efficacy
- Should not tarnish or corrode copper
- Should not leave behind any residues
- Cost lower or equal to CTC
- Locally available
- Low toxicity
- Free from carcinogenic substances
- Free from ozone depleting substances (ODS)

Ozone Depleting Solvents/Chemical

Chemical Name	Lifetime years	ODP	GWP	Chemical Abstracts Service Number (CAS)
CFC-11 (CCl ₃ F) Trichlorofluoromethane	45	1	4750	75-69-4
CFC-12 (CCl ₂ F ₂) Dichlorodifluoromethane	100	1	10900	75-71-8
CCl ₄ Carbon tetrachloride	26	1.1	1400	56-23-5
HCFC-22 (CHF ₂ Cl) Monochlorodifluoromethane	11.9	0.055	1810	75-43-6
HCFC-141b (C ₂ H ₃ Cl ₂) Dichlorofluoroethane	9.2	0.11	725	1717-00-6

Tab. 4.6.4.2 Ozone Depleting Solvents

Environmental Characteristics

Refrigerant		Atmospheric Lifetime (Yrs)	Ozone Depletion Potential (ODP)	Global Warming Potential (GWP) (100 Yrs)
CFC (no more)	CFC-11 (Baseline ODP)	50	1	4750
	CFC-12	102	1	10900
HCFCs	HCFC-22	13.3	0.055	1810
	HCFC-123	1.4	0.02	77
	HCFC-141b	9.4	0.11	725
HFCs	HFC-134a	14.6	0	1430
	HFC-245fa	7.3	0	1030
	R-32	-	0	675
HCs	HC-290 (Propane)	-	0	3
	R-1270 (Propylene)	-	0	<2
HFC Blends	R-404A	-	0	3922
	R-407A	-	0	2107
	R-407C	-	0	1774
	R-410A	-	0	2088
Ammonia	R-717	-	0	<1
Carbon di oxide	R-744	-	0	1
Carbon Tetrachloride	C Cl ₄	26	1.1	1400

Tab. 4.6.4.3 Environmental Characteristics

4.6.5 Good Working Practice

Hazard potential of alternatives

No alternative is perfect. Each substance has specific limitations and is a hazard for health and safety. While all solvents are toxic, the degree varies from one substance to another. Understanding the strengths and weaknesses of alternatives is essential for taking informed decisions. In the context of circuitry cleaning, particularly the risk of inhalation and skin contact needs to be considered. The table below shows the hazard ratings of the alternatives discussed above. Ratings distinguish six grades shown with a corresponding colour shade. The least risk is shown in green, followed by shades of yellow and orange. Red represents the most severe risk.


Group	Risk	Inhalation	Skin	Environment	Flammability
E	High	Severely Toxic	Severely Toxic	Very hazardous	Extremely flammable
D		Very toxic	Very toxic	Hazardous	Highly flammable
C		Toxic	Toxic		Flammable
B		Harmful	Harmful	Combustible	
A		Irritant	Irritant	Possibly combustible	
-	low	none	none	not classified	Non-flammable
Viable alternatives					
Hazard rating					
	Inhalation	Skin	Environment	Flammability	
Methylene Chloride	D	C			
Toluene aka Methylbenzene	D	C			D
Perchloroethylene (PCE)	D	C	E		
n-Hexane	D	C	E		D
White Petrol	D	C	E		D
Water					
Carbon Tetrachloride (CTC)	D	C	E		
Trichloroethylene (TCE)	E	E	C		

Fig. 4.6.5.1 EHS Evaluation

For comparison the risk levels of Water, CTC and TCE are also shown.

The selection of a solvent should be made so as to reduce the hazard as far as feasible. However, as is apparent from the ratings above, for circuitry cleaning there is hardly any choice because all substances are classified as “Very toxic” for “Inhalation” and “Toxic” under “Skin”. Safe use can therefore not be ensured by a prudent selection alone. The following section will guide you on measures to safeguard health and safety.

Controlling the risk

The toxic potential of alternatives combined with typical exposure situations in circuitry cleaning makes safety measures necessary. Risk control follows certain priorities. Substitution is generally accorded the highest. Next in line are engineering controls such as ventilation followed by administrative controls. The use of personal protective equipment should be the last measure in exposure control.

What you can do

Prudent substance selection: Select the safest possible substance.

Consult an MSDS: Demand a material safety data sheet (MSDS) of the solvent from your retailer. Study specifically the sections on health risks, fire risks and first aid.



Fig. 4.6.5.2 MSDS / SDS

Limit the quantity: You might need less solvent than you think you need. Most technicians overestimate the requirement for circuitry cleaning. Assess the required quantity carefully and use no more. It is believed that solvent exposure can be reduced significantly by this measure alone.

Purge with inert gases: Though some solvents do not have a flash point, all should be considered as flammable. Therefore purging with air could lead to explosions. Use only inert gases like nitrogen.

Ensure good ventilation: All solvents are toxic. While performing the cleaning operation the solvents evaporates into the surroundings. If the person experiences drowsiness or nausea, it is an indication that concentration of solvent vapours is above tolerable limits in the surroundings and there is a need for better ventilation of the cleaning area. The possible options include:

- Shift cleaning operations to an area with high ceilings and cross-ventilation.
- If there is a perceivable flow of air, clean downwind so that the air first reaches you and then the circuitry being cleaned. That way the air you breathe is cleaner.
- If none of these prove sufficient, consider the installation of local exhaust ventilation (LEV). LEVs capture contaminants before they disperse into the air of the workplace. Such systems consist of a hood, a duct and an air cleaner. LEVs cannot be bought off the shelf and they have to be sized by experts to meet the specific requirements.

Training: Last but not least, training and instructions are the most important part of personal protection. Ensure that the workers involved in cleaning operations are aware of the hazards of substances used.



Fig. 4.6.5.3 Personal Protective Equipment (PPE)

Wear goggles: Flushing leads to a pressure build-up that may result into splashing of both solvent and contaminant. Building the pressure up gradually minimises the risk. However, protect your eyes with goggles.

Wear gloves: Skin contact with the solvent during flushing occurs regularly. All solvents remove the fat content of the skin. Only gloves can protect your skin adequately.

Recommended Hand Gloves

Substance Group	Nitrile	Neoprene	P V C	Viton
Water miscible substances, weak acids/alkalis		✓	✓	
Oils			✓	✓
Hexane	✓	✓		✓
Toulene*			✓	✓
Methylene DiChloride*	✓		✓	✓

Tab. 4.6.5.1 Recommended Hand Gloves

Safety in Solvents

- All operations involving CTC must be carried out in a certified chemical fume hood or well ventilated space.
- Chemical fume hoods used should have a face velocity of 35mtrs/min averaged over the face of the fume hood.
- Laboratory rooms must be at negative pressure with respect to the corridors and external environment. To achieve this, the laboratory/room door must be kept closed at all times.
- Keep container tightly closed in a dry and well-ventilated place.
- All Employees need reassurance to find and suggest changes in procedures to reduce exposure!

4.6.6 First Aid Procedure



Fig. 4.6.6.1 First Aid Process

General advice

- If inhaled,
- Move person into fresh air.
- Move out of dangerous area.
- If unable to breath, give artificial respiration.
- Handle with Nitrile or Supported Polyvinyl Alcohol.
- In case of skin contact, wash off with soap and plenty of water.
- In case of eye contact, rinse thoroughly with plenty of water for at least 15 minutes and consult a doctor.
- If swallowed, never give anything by mouth to an unconscious person. Rinse mouth with water and quickly consult doctor.
- Show the MSDS material safety data sheet to the doctor.





5. Soft Skills and Work Ethics

Unit 5.1 – Effective Communication and Coordination at Work

Unit 5.2 – Working Effectively and Maintaining Discipline at Work

Unit 5.3 – Maintaining Social Diversity at Work



Key Learning Outcomes



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 5.1: Effective Communication and Coordination at Work

Unit Objectives

By the end of this unit, participants will be able to:

1. Work effectively at the workplace.
2. Demonstrate practices related to gender and PwD sensitization.

5.1.1 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. 5.1.1 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. 5.1.2 Benefits of Workplace Ethics

5.1.2 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 5.1.3 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 collectively to achieve shared goals. Following are the interpersonal

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. Interpersonal communication skills that are 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 co-workers.

UNIT 5.2: Working Effectely 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.

5.2.1 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 actions to take while initiating disciplinary action

With well-defined and enforced disciplinary rules, an organization can avoid various safety, security, reputational risks

Fig 5.2.1 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.

Among a number of areas, discipline usually covers:

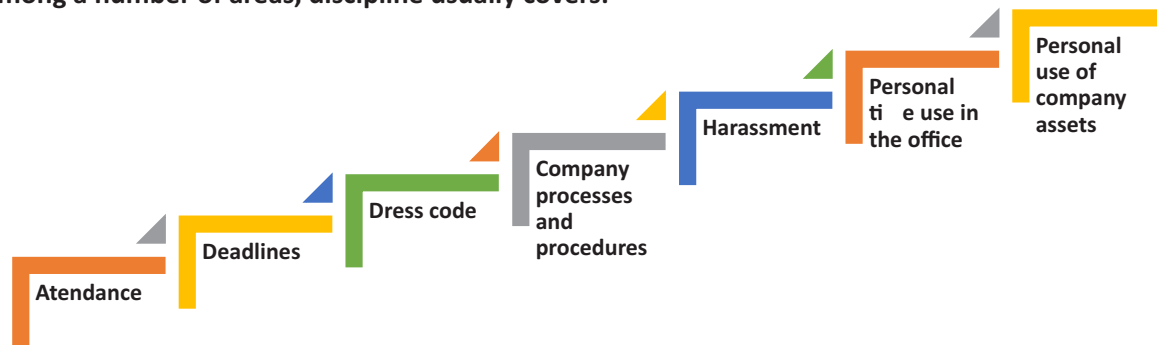


Fig 5.2.2 Examples of Workplace Discipline

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.

5.2.2 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.

5.2.3 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.

5.2.4 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.

5.2.5 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.

5.2.6 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.

5.2.7 Information or Data 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.

5.2.8 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.

5.2.9 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. Harboring negative emotions affects one emotionally, affecting their job performance also. Engaging in enjoyable activities after work is a good stress reliever.

UNIT 5.3: 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 sensitivity for different genders and Persons with Disabilities (PwD).

5.3.1 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 5.3.1 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.
- **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.

5.3.2 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 self-dependent 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.

Notes





6. Basic Health and Safety Practices

Unit 6.1 - Workplace Hazards

Unit 6.2 - Fire Safety

Unit 6.3 - First Aid

Unit 6.4 - Waste Management



Key Learning Outcomes



By the end of this module, participants 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 to 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 6.1: 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.

6.1.1 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.

6.1.2 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.

6.1.3 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.

6.1.4 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. 6.1.1. Prohibition Warning 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. 6.1.2. Mandatory Signs

3. Warning Signs

Warning signs are the safety information communication signs. They are shown as a 'yellow colour triangle'.



Fig. 6.1.3. Warning Signs

4. Emergency Signs

The location or routes to emergency facilities are indicated by emergency signs. These signs have a green backdrop with a white emblem or writing. These signs convey basic information and frequently refer to housekeeping, company procedures, or logistics.



Fig. 6.1.4. Emergency Signs

6.1.5 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.
2. **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.

6.1.6 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

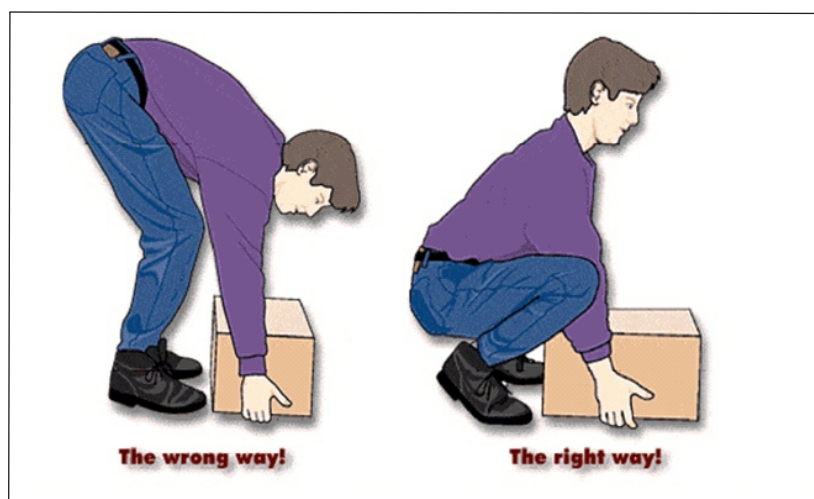


Fig. 6.1.5. Lifting loads technique

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.

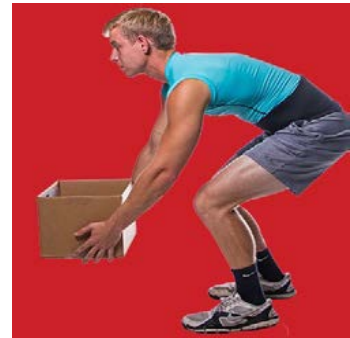
Techniques for Lifting Heavy Objects

Technique	Demonstraton
<p>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.</p>	
<p>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.</p>	

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 6.1.1 Techniques for lifting heavy objects

³Source: <https://www.braceability.com/blogs/articles/7-prop-heavy-lift-techniques>

6.1.7 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.

6.1.8 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 from the following injuries are:

Injury Protection	Protection	PPE
Head Injury Protection	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 Protection	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 Protection	Spectacles, goggles, special helmets or shields, and spectacles with side 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.	




<p>Protecton against Hearing Loss</p>	<p>Hearing protection can be obtained by wearing earplugs or earmuffs. High noise levels can result in permanent hearing loss or damage, as well as physical and mental stress. Self-forming earplugs composed of foam, waxed cotton, or fibreglass wool usually fit well. Workers should be fitted for moulded or prefabricated earplugs by a specialist.</p>	
<p>Hand Injury Protecton</p>	<p>Hand protection will aid workers who are exposed to dangerous substances by skin absorption, serious wounds, or thermal burns. Gloves are a frequent protective clothing item. When working on electrified circuits, electricians frequently use leather gloves with rubber inserts. When stripping cable with a sharp blade, Kevlar gloves are used to prevent cuts.</p>	
<p>Whole Body Protecton</p>	<p>Workers must protect their entire bodies from risks such as heat and radiation. Rubber, leather, synthetics, and plastic are among the materials used in whole-body PPE, in addition to fire-retardant wool and cotton. Maintenance staff who operate with high-power sources such as transformer installations and motor-control centres are frequently obliged to wear fire-resistant clothes.</p>	

Table 6.1.2. Personal protective equipment

UNIT 6.2: 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.

6.2.1 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.

6.2.2 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.

6.2.3 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.



UNIT 6.3: First Aid

Unit Objectives

By the end of this unit, participants will be able to:

1. Explain how to 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.

6.3.1 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.

6.3.2 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.

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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.

6.3.3 Treating Minor Cuts and Scapes

Steps to keep cuts clean and prevent infections and 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.

6.3.4 Heart Attack

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.

Notes



A large rectangular area with a thin orange border, containing 20 horizontal lines for writing notes.

UNIT 6.4: Waste Management

Unit Objectives

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 pollution and ways to minimize them.
3. Elaborate on electronic waste disposal procedures.

6.4.1. 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.

6.4.2 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.

6.4.3 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.

6.4.4 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.

6.4.5 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

1. Name all five types of fire extinguishers.
2. Explain PPE in brief.
3. List the common workplace hazards.
4. Fill in the blanks:
 - 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 _____.

7. Employability & Entrepreneurship Skills



Unit 7.1 – Personal Strengths & Value Systems

Unit 7.2 – Digital Literacy: A Recap

Unit 7.3 – Money Matters

Unit 7.4 – Preparing for Employment & Self-Employment

Unit 7.5 – Understanding Entrepreneurship

Unit 7.6 – 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 Swachh 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 7.1: Personal Strengths & Value Systems

Unit Objectives

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
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28. Discuss tips for anger management
29. Discuss the causes of stress
30. Discuss the symptoms of stress
31. Discuss tips for stress management

7.1.1 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

Prevent Health Issues

Taking measures to prevent ill health is always better than curing a disease or sickness. You can stay healthy by:

- 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.
2. 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.

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.

See how healthy and hygienic you are, by giving yourself 1 point for every ticked statement! Then take a look at what your score means.

Your Score

0-7/20: You need to work a lot harder to stay fit and fine! Make it a point to practice good habits daily and see how much better you feel!

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!

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.

Swachh Bharat Abhiyan

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!

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
- Smiling! Make it a habit to smile as often as possible
- Making exercise a part of your daily routine
- Making time for family and friends
- Reading motivational and inspirational stories
- Going to bed early and waking up early

Some bad habits that you should quit immediately are:

- Skipping breakfast
- Smoking, drinking alcohol and doing drugs
- Snacking frequently even when you are not hungry
- Spending more money than you can afford
- Eating too much fattening and sugary food
- Worrying about unimportant issues
- Staying up late and waking up late



- 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.

7.1.2: 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

Non-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



- Be aware of what emergency number to call at the time of a workplace emergency
- Practice evacuation drills regularly to avoid chaotic evacuations

7.1.3 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.

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.

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. These needs are usually shown as a pyramid with five levels and are known as Maslow's Hierarchy of Needs.

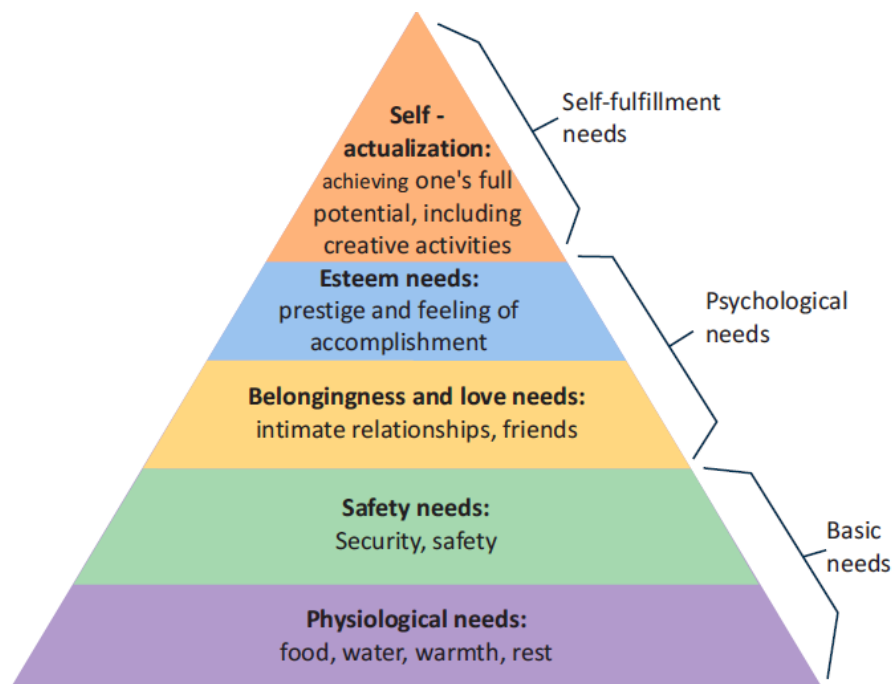


Fig. 7.1.1: Maslow's Hierarchy of Needs

As you can see from the pyramid, the lowest level depicts the most basic needs. Maslow believed that our behaviour is motivated by our basic needs, until those needs are met. Once they are fulfilled, we move to the next level and are motivated by the next level of needs. Let's understand this better with an example.

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.

Understanding Achievement Motivation

We now know that people are motivated by basic, psychological and self-fulfilment 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.

What Motivates You?

What are the things that really motivate you? List down five things that really motivate you. Remember to answer honestly!

I am motivated by:

Characteristics of Entrepreneurs with Achievement Motivation

Entrepreneurs 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
- Highly creative and innovative
- Restless - constantly looking to achieve more
- Feel personally responsible for solving problems

Think about it:

- How many of these traits do you have?
- Can you think of entrepreneurs who display these traits?

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:

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“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.

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

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



- Achievement motivation can be learned.
- Don't be afraid to make mistakes.
- Train yourself to finish what you start.
- Dream big.

7.1.4 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.

Qualities of Honest People

Honest individuals have certain distinct characteristics. Some common qualities among honest people are:

1. 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.
2. 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.
3. They are thick-skinned. This means they are not affected by others judging them harshly for their honest opinions.
4. 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.
5. They are trusted by their peers. They are seen as people who can be counted on for truthful and objective feedback and advice.

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.
- **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 start-ups 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.

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, eating 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.

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 behaviour 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 hard work, and sharing the credit for accomplishments.

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.



- 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.

7.1.5 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



- 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.

7.1.6 Time Management: What is 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
- Better professional reputation
- Higher chances for career advancement
- Higher efficiency
- Reduced stress
- Greater opportunities to achieve goals

Not managing time effectively can result in undesirable consequences like:

- Missing deadlines
- Substandard work quality
- Stalled career
- Inefficient work output
- Poor professional reputation
- Increase in stress and anxiety

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

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.



- 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.

7.1.7 Anger Management: What is 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.

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)

5. Picture a relaxing moment (this can be from your memory or your imagination)
6. 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.

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.



- Try to forgive those who anger you, rather than hold a grudge against them.
- Avoid using sarcasm and hurling insults. Instead, try and explain the reason for your frustration in a polite and mature manner.

7.1.8 Stress Management: What is Stress?

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

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

- Memory problems
- Concentration issues
- Lack of judgement
- Pessimism
- Anxiety
- Constant worrying

Emotional Symptoms

- Depression
- Agitation
- Irritability
- Loneliness
- Anxiety
- Anger

Physical Symptoms	Behavioural Symptoms
<ul style="list-style-type: none"> • Aches and pain • Diarrhoea or constipation • Nausea • Dizziness • Chest pain and/or rapid heartbeat • Frequent cold or flu like feelings 	<ul style="list-style-type: none"> • Increase or decrease in appetite • Over sleeping or not sleeping enough • Withdrawing socially • Ignoring responsibilities • Consumption of alcohol or cigarettes • Nervous habits like nail biting and pacing

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.



- Force yourself to smile even if you feel stressed. Smiling makes us feel relaxed and happy.
- Stop yourself from feeling and thinking like a victim. Change your attitude and focus on being proactive.

UNIT 7.2: 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

7.2.1 Computer and Internet basics: Basic Parts of a Computer

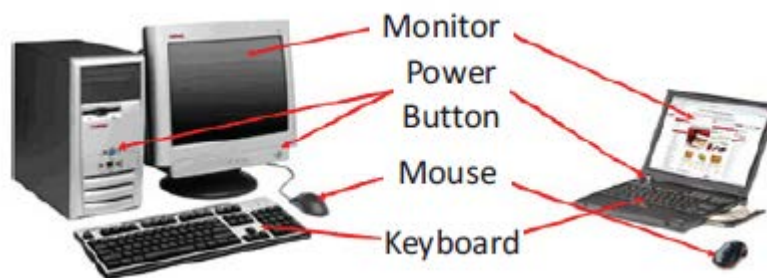


Fig.7.2.1. Parts of a Computer

- **Central Processing Unit (CPU):** The brain of the computer. It interprets and carries out program instructions.
- **Hard Drive:** A device that stores large amounts of data.
- **Monitor:** The device that contains the computer screen where the information is visually displayed.
- **Mouse:** A hand-held device used to point to items on the monitor.
- **Speakers:** Devices that enable you to hear sound from the computer.
- **Printer:** A device that converts output from a computer into printed paper documents.

Basic Parts of a Keyboard

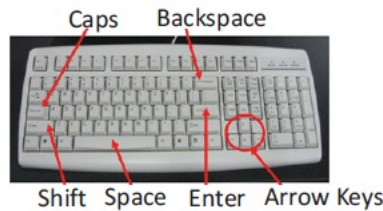


Fig.7.2.2. Parts of a Keyboard

- **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.

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.



- 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.

7.2.2 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.



- 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.

7.2.3 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.

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

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.



- Before launching your e-commerce platform, test everything.
- Pay close and personal attention to your social media.

UNIT 7.3: 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

7.3.1 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 stressed.
- **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.



- 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.

7.3.2 Types of Bank Accounts, Opening a Bank Account

Types of Bank Accounts

In India, banks offer four main types of bank accounts. These are:

- Current Accounts
- Savings Accounts
- Recurring Deposit Accounts
- 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.

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!



- 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.

7.3.3 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



- 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.

7.3.4 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 Samridhi 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.

Insurance

There are two types of insurance – Life Insurance and Non-Life or General Insurance.

Life Insurance

Life Insurance deals with all insurance covering human life.

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 categorized 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 – Direct Taxes and 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 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



- 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.

7.3.5 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

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 to:

- Transfer funds into your own accounts of the same bank.
- Transfer funds into different accounts of the same bank.
- Transfer funds into accounts in different bank, using NEFT.
- Transfer funds into other bank accounts using RTGS.
- Transfer funds into various accounts using 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 bank's name
- Recipient's account number
- Recipient's bank's IFSC code

RTGS

RTGS stands for Real Time Gross Settlement. This is a real-time fund 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

- Name of the beneficiary
- Beneficiary's account number
- Beneficiary's bank address
- Beneficiary's 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.

- Register for IMPS with your bank
- Receive a Mobile Money Identifier (MMID) from the bank
- Receive a MPIN from the bank

To transfer money through IMPS, the you need to:

Once you have both these, you can login or make a request through SMS to transfer a particular amount to a beneficiary.

For the beneficiary to receive the transferred money, he must:

1. Link his mobile number with his respective account

2. Receive the MMID from the bank

In order to initiate a money transfer through IMPS, you will need to enter the following information:

1. The beneficiary's mobile number
2. The beneficiary's MMID
3. The transfer amount
4. 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.

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



- 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 7.4: Preparing for Employment & Self-Employment

Unit Objectives

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

7.4.1 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:

1. **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. Try 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:
 - What do you consider the most important criteria for success in this job?
 - How will my performance be evaluated?
 - What are the opportunities for advancement?
 - What are the next steps in the hiring process?
- Remember, never ask for information that is easily available on the company website.



- 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.

7.4.2 Preparing an Effective Resume: How to Create 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:

Khyati Mehta
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 8-7 bullet points.

Example:

Profile Summary

- A Floor Supervisor graduated from University of Delhi having 6 years of experience in managing a retail outlet.
- Core expertise lies in managing retail staff, including cashiers and people working on the floor.

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

<Enter qualification> <enter date of qualification> from <enter name of institute> with <enter percentage or any other relevant scoring system>.

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

- *<Enter your technical skill here, if applicable>*

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: *<Insert project title>*

Organization: *<Insert the name of the organization for whom you did the project>*

Platform used: *<Insert the platform used, if any>*

Contribution: *<Insert your contribution towards this project>*

Description: *<Insert a description of the project in one line>*

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:

< Insert your extracurricular activity here. E.g.: Member of, _____ played (name of sport) at _____ level, won (name of prize/award) for _____ >

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



- 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.

7.4.3 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.



- Be honest and confident while answering.
- Use examples of your past experiences wherever possible to make your answers more impactful.

7.4.4 Work Readiness – Terms & Terminologies: Basic Workplace Terminology

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 7.5: Understanding Entrepreneurship

Unit Objectives

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. Explain 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 purpose of the Make in India campaign
26. Discuss key schemes to promote entrepreneurs
27. Discuss the relationship between entrepreneurship and risk appetite
28. Discuss the relationship between entrepreneurship and resilience
29. Describe the characteristics of a resilient entrepreneur
30. Discuss how to deal with failure

7.5.1 Concept Introduction (Characteristic of Entrepreneur, types of firms / types of enterprises)

Entrepreneurs and Entrepreneurship

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.

Importance of Entrepreneurship

1. Entrepreneurship is very important for the following reasons:
2. It results in the creation of new organizations
3. It brings creativity into the marketplace
4. It leads to improved standards of living
5. It helps develop the economy of a country

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

Examples of Famous Entrepreneurs

Some famous entrepreneurs are:

- Dhirubhai Ambani (Reliance)
- Azim Premji (Wipro)
- Dr. Karsanbhai Patel (Nirma)
- Anil Agarwal (Vedanta Resources)

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.



- 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.

7.5.2 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.

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.

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

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.

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.



- 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.

7.5.3 Communication Skills: Listening & Speaking the Importance of Listening Effectively

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.

How to Listen Effectively?

To listen effectively you should:

- Stop talking
- Stop interrupting
- Focus completely on what is being said
- 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

- Nod and use encouraging words and gestures
- Be open-minded
- Think about the speaker's perspective
- Be very, very patient
- Not let the speaker's mannerisms or habits irritate or distract you

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.

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.



- 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.

7.5.4 Problem Solving & Negotiation Skills: What is a Problem?

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.

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

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

Not panicking

Asking the right questions

Having a positive attitude

Being proactive

Focusing on the right problem

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.

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 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 alternate solutions to reach an outcome where both parties 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



- 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

7.5.5 Business Opportunities Identification: Entrepreneurs and Opportunities

“The entrepreneur always searches for change, responds to it and exploits it as an opportunity.”

Peter Drucker

The ability to identify business opportunities is an essential 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

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

1. Identify Market Inefficiencies

When looking at a market, consider what inefficiencies are present in the market. Think about ways to correct these inefficiencies.

2. Remove Key Hassles

Rather than create a new product or service, you can innovatively improve a product, service or process.

3. Create Something New

Think about how you can create a new experience for customers, based on existing business models.

4. 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.

5. 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:

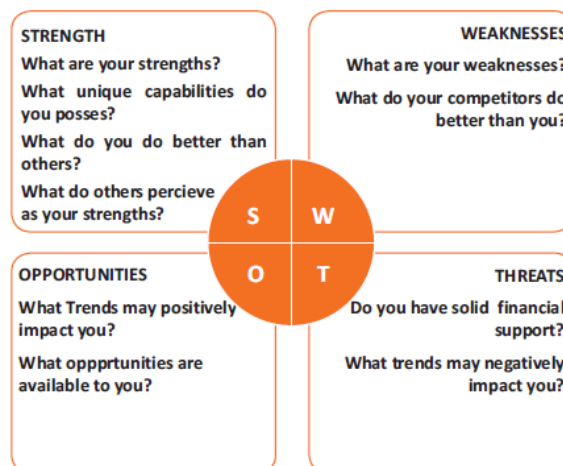


Fig.7.5.1. SWOT Analysis

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 and position yourself as different from your competitors. Identify why customers should buy from you and promote that reason.

Opportunity Analysis

Once you have identified an opportunity, you need to analyse it.

To analyse an opportunity, you must:

- Remember, opportunities are situational.
- Look for a proven track record.
- Avoid the latest craze.
- Love your idea.

7.5.6 Entrepreneurship Support Eco-System: Who is an Entrepreneur?

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

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.

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.

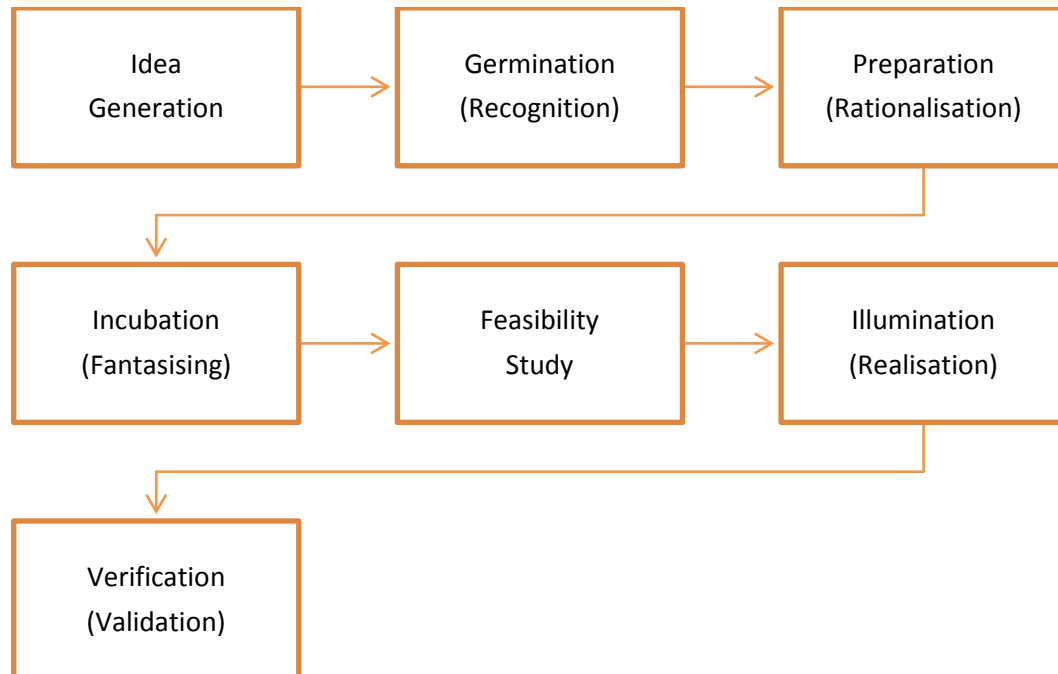
Stage 4: Incubation or Fantasizing. This stage involves creative thinking for the purpose of coming up with more ideas. Less thought is given to the problem areas.

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 usefu

Take a look at the diagram below to get a better idea of this process.



Introduction to the Entrepreneurship Ecosystem

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.

The six domains and their various elements have been graphically depicted.

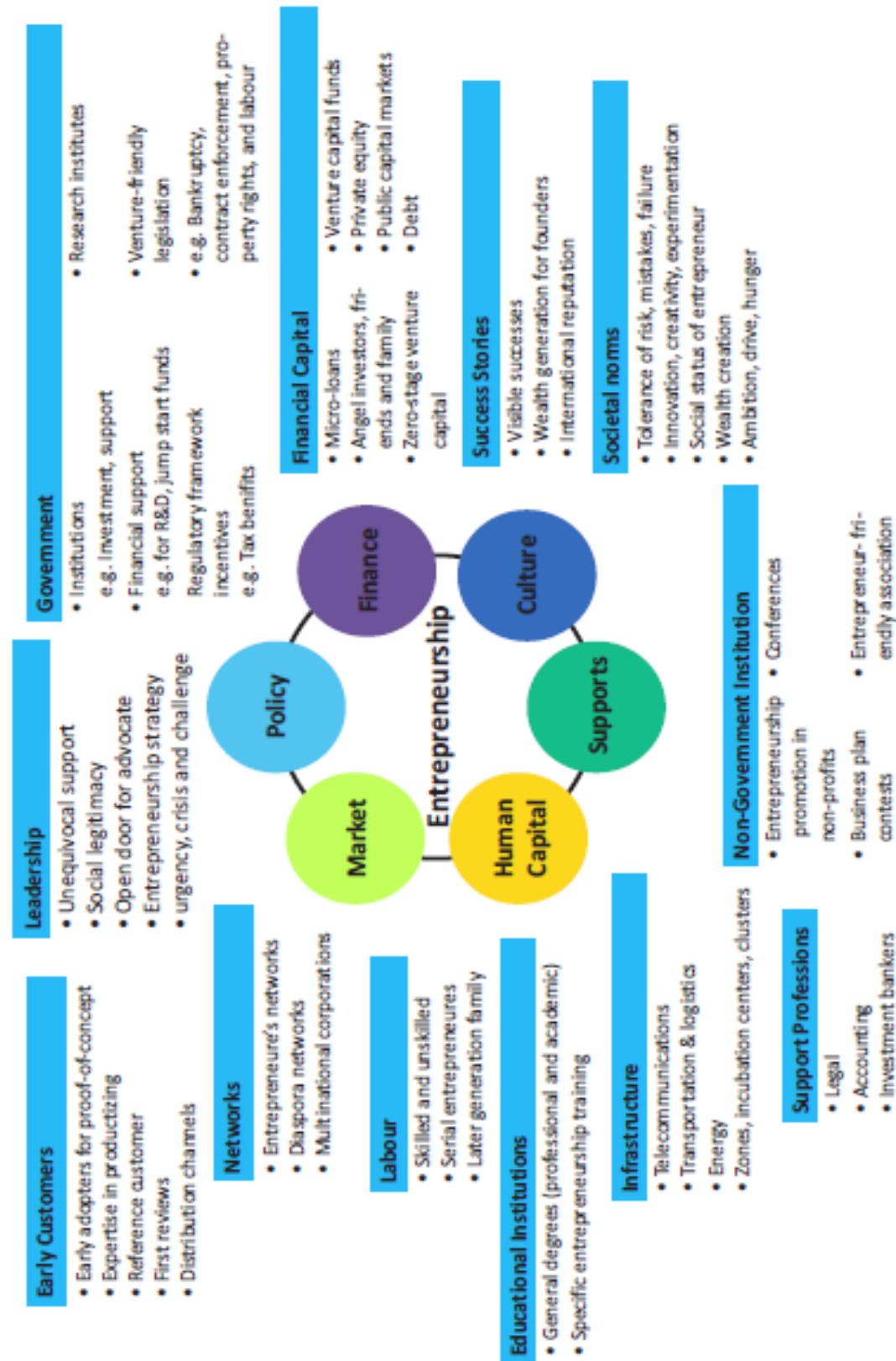


Fig.7.5.2. Entrepreneurship at a Glance

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 focussing on sustain ability of the environment.

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

Key Schemes to Promote Entrepreneurs

The government offers many schemes to support entrepreneurs. These schemes are run by various Ministries/Departments of Government of India to support First Generation Entrepreneurs. Take a look at a few key schemes to promote entrepreneurship:

Sl. Name of the Scheme

1. Pradhan Mantri MUDRA Yojana - Micro Units Development and Refinance Agency (MUDRA),
2. STAND UP INDIA
3. Prime Minister Employment Generation Programme (PMEGP)
4. International Cooperation
5. Performance and Credit Rating
6. Marketing Assistance Scheme
7. Reimbursement of Registration Fee for Bar Coding
8. Enable Participation of MSMEs in State/District level Trade Fairs and Provide Funding Support
9. Capital Subsidy Support on Credit for Technology up gradation
10. Credit Guarantee Fund for Micro and Small Enterprise (CGFMSE)

11. Reimbursement of Certification Fees for Acquiring ISO Standards
12. Agricultural Marketing
13. Small Agricultural Marketing
14. Mega Food Park
15. Adivasi Mahila Sashaktikaran Yojana

1. Pradhan Mantri MUDRA Yojana, - Micro Units Development and Refinance Agency (MUDRA),

Description

Under the aegis support of Pradhan Mantra MUDRA Yojana, MUDRA has already created its initial products/schemes. The interventions have been named 'Shisha', 'Kishore' and 'Taren' to signify the stage of growth/development and funding needs of the beneficiary micro unit/entrepreneur and also provide a reference point for the next phase of graduation/growth to look forward to:

- a. Shisha: Covering loans up to Rs. 50,000/-
- b. Kishor: Covering loans above Rs. 50,000/- and up to Rs.5 lakh
- c. Tarun: Covering loans above Rs. 5 lakh to Rs.10 lakh

Who can apply?

Any Indian citizen who has a business plan for a non-farm sector income generating activity such as manufacturing, processing, trading or service sector and whose credit need is less than Rs.10 lakh can approach either a Bank, MFI, or NBFC for availing of MUDRA loans under Pradhan Mantri Mudra Yojana (PMMY).

2. Stand Up India

Description

The objective of the Standup India scheme is to facilitate bank loans between Rs.10 lakh and Rs.1 crore to at least one Schedule Caste (SC) or Scheduled Tribe (ST) borrower and at least one woman borrower per bank branch for setting up a Greenfield enterprise. This enterprise may be in manufacturing, services or the trading sector. In case of non-Individual enterprises at least 51% of the shareholding and controlling stake should be held by either an SC/ST or Woman Entrepreneur.

Who can apply?

ST, SC & Women

3. Prime Minister Employment Generation Programme (PMEGP)

Description

The Scheme is implemented by Khadi and Village Industries Commission (KVIC), as the nodal agency at the National level. At the State level, the Scheme is implemented through State KVIC Directorates, State Khadi and Village Industries Boards (KVIBs) and District Industries Centres (DICs) and banks. The Government subsidy under the Scheme is routed by KVIC through identified banks for eventual distribution to the beneficiaries/entrepreneurs in their bank accounts.

Nature of assistance

The maximum cost of the project/unit admissible under manufacturing sector is Rs.25 lakh and under business/service sector is Rs.10 lakh. Levels of funding under PMEGP

Categories of beneficiaries under PMEGP	Beneficiary's contribution (of project cost)	Rate of Subsidy (of project cost)
Area (location of project/unit)		Urban Rural
General Category	10%	15% 25%
Special (including SC / ST / OBC / Minorities / Women, Ex-servicemen, Physically handicapped, NER, Hill and Border areas, etc.	05%	25% 35%

The balance amount of the total project cost will be provided by Banks as term loan as well as working capital.

Who can apply?

Any individual, above 18 years of age. At least VIII standard pass for projects costing above Rs.10 lakh in the manufacturing sector and above Rs.5 lakh in the business/service sector. Only new projects are considered for sanction under PMEGP. Self Help Groups (including those belonging to BPL provided that they have not availed benefits under any other Scheme), Institutions registered under Societies Registration Act, 1860; Production Co-operative Societies, and Charitable Trusts are also eligible. Existing Units (under PMRY, REGP or any other scheme of Government of India or State Government) and the units that have already availed Government Subsidy under any other scheme of Government of India or State Government are NOT eligible.

4. International Cooperation

Description

The Scheme would cover the following activities:

- Deputation of MSME business delegations to other countries for exploring new areas of technology infusion/upgradation, facilitating joint ventures, improving market of MSMEs products, foreign collaborations, etc.
- Participation by Indian MSMEs in international exhibitions, trade fairs and buyer-seller meets in foreign countries as well as in India, in which there is international participation.
- Holding international conferences and seminars on topics and themes of interest to the MSME.

Nature of assistance

IC Scheme provides financial assistance towards the airfare and space rent of entrepreneurs. Assistance is provided on the basis of size and the type of the enterprise.

Who can apply?

- a. State/Central Government Organization
- b. Industry/Enterprise Associations; and
- c. Registered Societies/Trusts and Organizations associated with the promotion and development of MSMEs

5. Performance and Credit Rating for Micro and Small Enterprises**Description**

The objective of the Scheme is to create awareness amongst micro & small enterprises about the strengths and weaknesses of their operations and also their credit worthiness.

Turn Over	Fee to be reimbursed by Ministry of MSME
Up to Rs.50 lacs	75% of the fee charged by the rating agency subject to a ceiling Rs. 15,000/-
Above Rs.50 lacs to Rs.200 Lacs	75% of the fee charged by the rating agency subject to a ceiling of Rs.30,0001-
Above Rs.200 lacs	75% of the fee charged by the rating agency subject

Nature of assistance**Who can apply?**

Any enterprise registered in India as a micro or small enterprise is eligible to apply.

6. Marketing Assistance Scheme**Description**

The assistance is provided for the following activities:

- a. Organizing exhibitions abroad and participation in international exhibitions/trade fairs
- b. Co-sponsoring of exhibitions organized by other organisations/industry associations/agencies
- c. Organizing buyer-seller meets, intensive campaigns and marketing promotion events

Nature of assistance

Financial assistance of up to 95% of the airfare and space rent of entrepreneurs. Assistance is provided on the basis of size and the type of the enterprise. Financial assistance for co-sponsoring would be limited to 40% of the net expenditure, subject to maximum amount of Rs.5 lakh.

Who can apply?

MSMEs, Industry Associations and other organizations related to MSME sector.

7. Reimbursement of Registration Fee for Bar Coding**Description**

The financial assistance is provided towards 75% reimbursement of only one-time registration fee and 75% of annual recurring fee for first three years paid by MSEs to GS1 India for using bar coding.

Nature of assistance

Funding support for reimbursement of 75% of one time and recurring bar code registration fees.

Who can apply?

All MSMEs with EM registration.

8. Enabling Participation of MSMEs in State/District Level Trade Fairs and Provide Funding Support**Description**

Provide marketing platform to manufacturing MSMEs by enabling their participation in state/district level exhibitions being organized by state/district authorities/associations.

Nature of assistance

1. Free registration for participating in trade fairs

Note: *The selection of participants would be done by the MSME-DIs post the submission of application.*

2. Reimbursement of 50% of to and fro actual fare by shortest distance/direct train (limited to AC II tier class) from the nearest railway station/bus fare to the place of exhibition and 50% space rental charges for MSMEs (General category entrepreneurs).

3. For Women/SC/ST entrepreneurs & entrepreneurs from North Eastern Region Govt. of India will reimburse 80% of items listed above in Point (2).

Note: The total reimbursement will be max. Rs. 30,000/- per unit for the SC/ST/Women/Physically Handicapped entrepreneurs, while for the other units the max. limit will be Rs. 20,000/- per person per MSME unit.

Note: *The participant is required to submit follow-up proofs post attending the event to claim reimbursement. The proofs can be submitted after logging in online under the section "My Applications" or directly contacting a DI office.*

Who can apply?

All MSMEs with EM registration.

9. Capital Subsidy Support on Credit for Technology Upgradation**Description**

MSMEs can get a capital subsidy (~15%) on credit availed for technology upgradation.

Nature of assistance

Financial assistance for availing credit and loan.

Who can apply?

1. Banks and financial institutions can apply to DC-MSME for availing support.

2. MSMEs need to directly contact the respective banks for getting credit and capital subsidy.

How to apply?

If you are a financial institution, click on the "Apply Now" button or else you can also directly contact the Office of DC-MSME. You can view the contact details of Office of DC-MSME. If

you are an MSME, directly contact the respective banks/financial institutions as listed in the scheme guidelines.

10. Provision of Collateral Free Credit for MSMEs

Description

Banks and financial institutions are provided funding assistance under this scheme so that they can in turn lend collateral free credit to MSMEs.

Nature of assistance

Funding support to banks and financial institutions for lending collateral-free credit to MSMEs.

Who can apply?

Banks and financial institutions can apply to office of DC-MSME/MSME-DIs for availing support. MSMEs need to directly contact the respective banks for getting credit.

11. Reimbursement of certification fees for acquiring ISO standards

ISO 9000/ISO 14001 Certification Reimbursement.

Description

The GoI assistance will be provided for one-time reimbursement of expenditure to such MSME manufacturing units which acquire ISO 18000/ISO 22000/ISO 27000 certification.

Nature of assistance

Reimbursement of expenditure incurred on acquiring ISO standards.

Who can apply?

MSMEs with EM registration.

12. Agricultural Marketing

Description

A capital investment subsidy for construction/renovation of rural godowns . Creation of scientific storage capacity and prevention of distress sale.

Nature of assistance

Subsidy @ 25% to farmers, 15% of project cost to companies.

Who can apply?

NGOs, SHGs, companies, co-operatives.

13. Small Agricultural Marketing

Description

Business development description provides venture capital assistance in the form of equity, and arranges training and visits of agripreneurs

Farmers' Agriculture Business Consortium

Business development description provides venture capital assistance in the form of equity, and arranges training and visits of agripreneurs.

Nature of assistance

Financial assistance with a ceiling of Rs.5 lakh.

Who can apply?

Individuals, farmers, producer groups, partnership/propriety firms, SGHs, agripreneurs, etc.

14. Mega Food Park**Description**

Mechanism to link agricultural production and market to maximize value addition, enhance farmer's income, create rural employment.

Nature of assistance

One-time capital grant of 50% of project cost with a limit of Rs.50 crore.

Who can apply?

Farmers, farmer groups, SHGs.

15. Adivasi Mahila Sashaktikaran Yojana**Description**

Concessional scheme for the economic development of ST women.

Nature of assistance

Term loan at concessional rates up to 90% of cost of scheme.

Who can apply?

Scheduled Tribes Women.



- 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.

7.5.7 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) have to evaluate all potential alternatives and select 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.
- 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



- 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.

7.5.8 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!



- Remember that nothing is impossible.
- Identify your mission and your purpose before you start.
- Plan your next steps – don't make decisions hastily.

UNIT 7.6: 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

7.6.1 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.

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:

- A tangible good
- An intangible 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 does the customer want from the product/service?
- How will customers use it?
- What needs does it satisfy?
- What should it be called?
- Are there any more features that can be added?
- How is it different from similar products?
- Does it have any expensive and unnecessary features?
- How much will it cost to produce?

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 questions to ask yourself are:

• What is the value of the product/service to customers?	• Is the customer price sensitive?
• Do local products/services have established price points?	• 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

Some questions to ask yourself are:

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.



- 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.

7.6.2 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.
- Business Transactions: There are three types of business transactions. These are:
 - Simple Transactions – Usually a single transaction between a vendor and a customer. For example: Buying a cup of coffee.
 - Complex Transactions – These transactions go through a number of events before they can be completed. For example: Buying a house.
 - Ongoing transactions – These transactions usually require a contract. For example: Contract with a vendor.

Basic Accounting Formulas

Take a look at some important accounting formula that every entrepreneur needs to know.

1. **The Accounting Equation:** This is value of everything a company owns and uses to conduct its business.
Formula: $\text{Assets} = \text{Liability} + \text{Owner's Equity}$
2. **Net Income:** This is the profit of the company.
Formula: $\text{Net Income} = \text{Revenues} - \text{Expenses}$
3. **Break-Even Point:** This is the point at which the company will not make a profit or a loss. The total cost and total revenues are equal.
Formula: $\text{Break-Even} = \text{Fixed Costs} / \text{Sales Price} - \text{Variable Cost per Unit}$
4. **Cash Ratio:** This tells us about the liquidity of a company.
Formula: $\text{Cash Ratio} = \text{Cash} / \text{Current Liabilities}$
5. **Profit Margin:** This is shown as a percentage. It shows what percentage of sales are left over after all the expenses are paid by the business.
Formula: $\text{Profit Margin} = \text{Net Income} / \text{Sales}$
6. **Debt-to-Equity Ratio:** This ratio shows how much equity and debt a company is using to finance its assets, and whether the shareholder equity can fulfil obligations to creditors if the business starts making a loss.
Formula: $\text{Debt-to-Equity Ratio} = \text{Total Liabilities} / \text{Total Equity}$
7. **Cost of Goods Sold:** This is the total of all costs used to create a product or service, which has been sold.
Formula: $\text{Cost of Goods Sold} = \text{Cost of Materials/Inventory} - \text{Cost of Outputs}$
8. **Return on Investment (ROI):** This is usually shown as a percentage. It calculates the profits of an investment as a percentage of the original cost.
Formula: $\text{ROI} = \text{Net Profit} / \text{Total Investment} * 100$

9. **Simple Interest:** This is money you can earn by initially investing some money (the principal).

Formula:

$$A = P(1 + rt); R = r * 100$$

Where:

A = Total Accrued Amount (principal + interest)

P = Principal Amount

I = Interest Amount

r = Rate of Interest per year in decimal; $r = R/100$

t = Time Period involved in months or years

10. **Annual Compound Interest:** This calculates the addition of interest to the principal sum of a loan or deposit.

Formula:

$$A = P (1 + r/n)^{nt}$$

Where:

A = the future value of the investment/loan, including interest

P = the principal investment amount (the initial deposit or loan amount)

r = the annual interest rate (decimal)

n = the number of times that interest is compounded per year

t = the number of years the money is invested or borrowed for

7.6.3 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:
 - 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

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
- Meeting positive and enthusiastic people
- Increased business opportunities
- Increased self-confidence
- Good source of relevant connections
- Satisfaction from helping others
- Advice from like-minded entrepreneurs
- Building strong and lasting friendships
- Gaining visibility and raising your profile



- Use social media interactions to identify needs and gather feedback.
- When networking, ask open-ended questions rather than yes/no type questions.

7.6.4 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 accountability and control the fate of the business. It usually offers a 3-5 year 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.

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, distributors 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.



- 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.

7.6.5 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.

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.

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 security
- Good reputation
- Adequate shareholders' funds
- Experience in business

The Procedure



To apply for funding the following procedure will need to be followed.

1. Submit your application form and all other required documents to the bank.
2. 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.
3. The bank will make a decision as to whether or not you should be given funding.



- 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.

7.6.6 Enterprise Management - An Overview: How to Manage Your Enterprise?



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!



- 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.

7.6.7 20 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 mentor or industry expert that I can call on?
5. Who is my ideal customer?
6. Who are my competitors?
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 SWOT 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 product 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 even or make a profit?
16. How will those who invest in my idea make a profit?
17. How should I set up the legal structure of my business?
18. What taxes will I need to pay?
19. What kind of insurance will I need?
20. Have I reached out to potential customers for feedback?



- 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 covers human.
- life while general insurance covers assets like animals, goods, cars etc

